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The magazine for Model 100 users

JANUARY
1984
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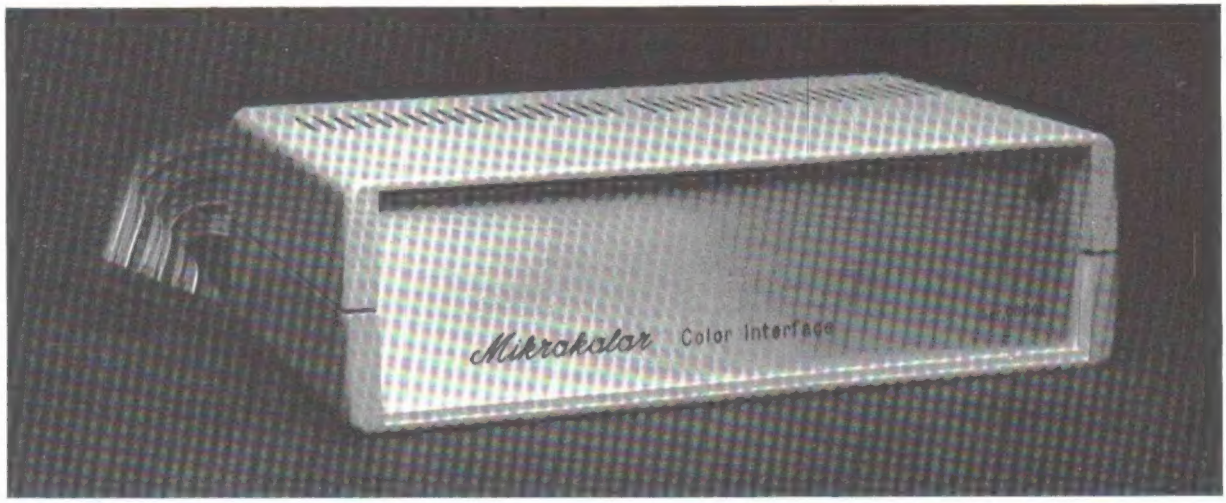

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See cover article to 80 Micro, May '83 for additional info.

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JANUARY 1984
VOL. 1 NO. 5

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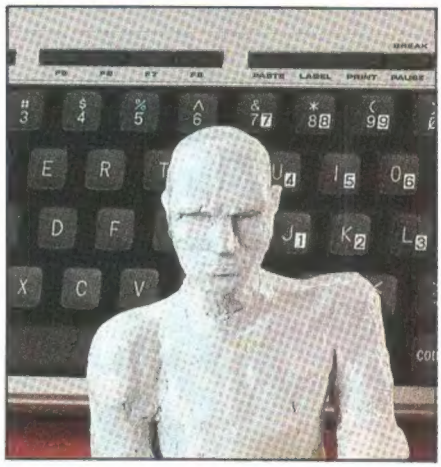

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What other types of software would you like to see made available for the Model 100?

_____

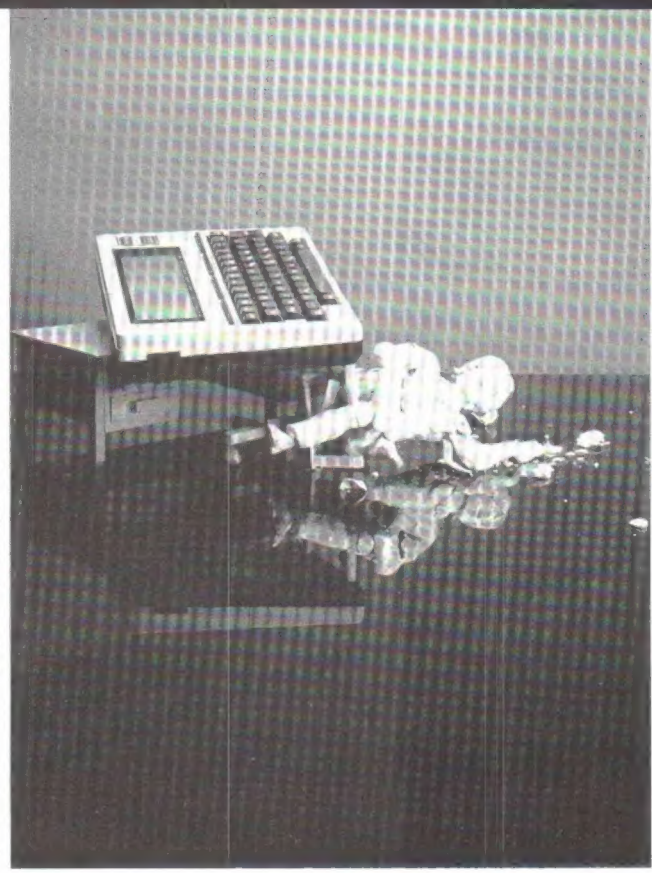
_____

JOHN P. MELLO JR.

PREVIEW

It's goodbye for The Grand Experiment. A look at our letter pages will tell you why. It seems the road to damnation isn't the only one paved with good intentions; so's the highway to bug-filled programs. Thus with this issue, we bid farewell to typesetting program listings. From now on, most listings will be printed on a daisy-wheel printer and photostated.

Listings will still be formatted, so multi-statement lines will be broken and indented, as will lines exceeding 40 characters. When typing in a listing, just remember to eliminate the leading blanks in a line, as you've had to do with listings in the first four issues of *Portable 100*.



MACHINE OF YEAR. It's with some trepidation we ran our Machine of the Year story. Although we work on the cutting edge of technology, some staffers still harbor deep-rooted superstitions about machines in general and computers in particular. And after our first ill-fated attempt to shoot our cover (see photo), we began worrying about omens ourselves.

We hurled aside our misgivings and decided to nominate the 100 for machine of the year anyway (page 26). We know the competition is rough. (We're talking about the same year Lisa was introduced. You remember Lisa, don't you?) But we think there are some good reasons for the nomination. See if you agree with us.

BATTLE ROYAL. Before the 100 was introduced last spring, *InfoWorld* ran a story about a snazzy little machine NEC sold in Japan and it was thinking of selling in the United States. In the article, NEC spokesmen were very cautious about the prospects of selling a lapper here. After all, look what happened to Epson when they tried to market a notebook computer in America. Enter the Model 100 and exit caution.

Which machine is better? That's a question raised time and time again. We've seen it on CompuServe's Model 100 special interest group. We even had one user call us long distance to get our opinions on the subject. Taking all this into account, we asked Danny Goodman, who has authored a book on the 100 and worked with both machines, to tell us about the NEC and how it stacks up to the 100. His observations start on page 34.

MORE GRAPHICS. When Richard Ramella submitted his animation program to us, he wrote, "I damned near decided to try to peddle this as software...I only brag ever so often. I think this is good." We are well-aware of Richard's modesty and agree with his opinion of Edimation.See what we mean starting on page 40.

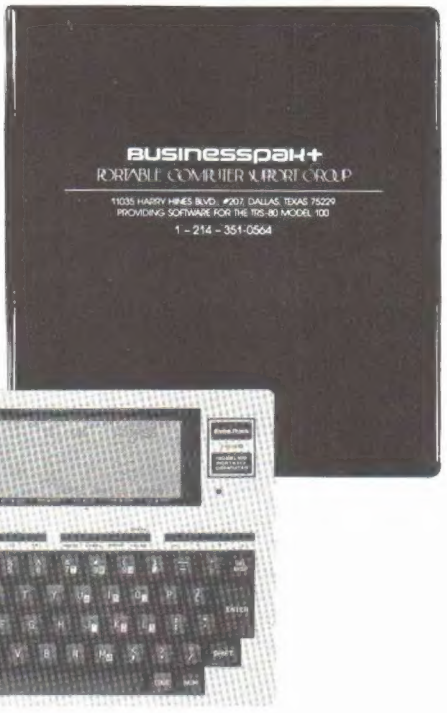
MICRORECORDERS. Have you looked at your CCR-81 and fondly dreamed of using a microcassette recorder to store your Model 100's program? You've tried, you say, and well, forget it. Paul Andreasen — known in the Model 100 world these days for Mikrocolor, the box that lets you plug your MEWS into a monitor or tv (*Portable 100*, November 1983, page 61) — says you can use a microcassette recorder effectively. All it takes is a minor modification of your cassette plug. He'll tell you how to do it on page 20.

BETTER PROGRAMMING. Many of you may be familiar with Gary Bender's name from CIS's 100 SIG. His version of Terry Dettman's spreadsheet program for the 100 is very popular among sigers. Gary is starting a series on how to be a better programmer (page 47). His tips on how to organize your programs should be helpful to novice and veteran programmers alike.

BIG BROTHER. Two of our columnists, Bill Louden (page 24) and Jake Commander (page 22) decided to kick off the new year with some thoughts on 1984 — a year getting bad press since 1948. Neither columnist sees Orwell's nightmare happening overnight, although they differ on the effect microcomputers in the hands of individuals may have on future scenarios.

Meanwhile, David Busch has written a game for those of you always wanting to dabble in the stock market. And Bill Walters will give you some insights into how the 100's ROM is set up.

LOOK FOR DISK +
ON PAGE 46



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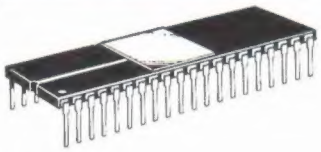

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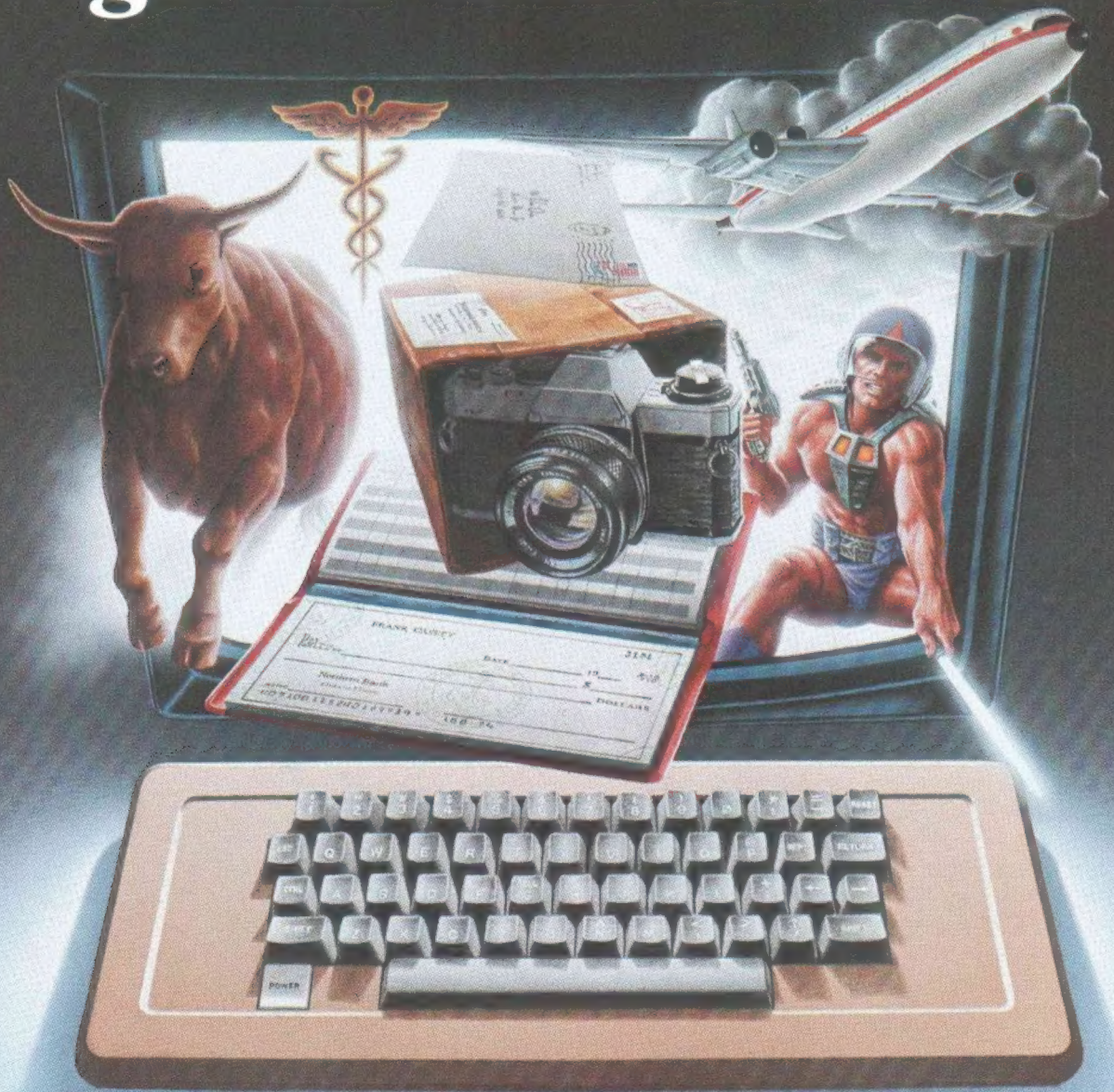

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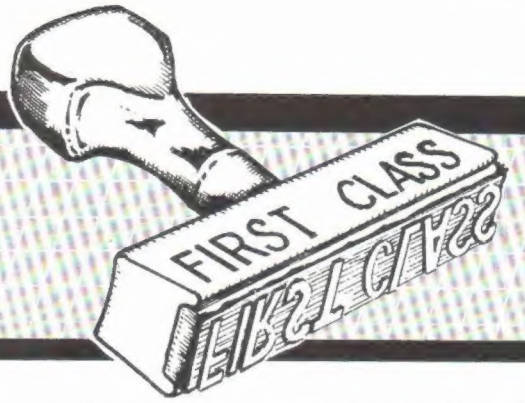

Editor's Note: In addition to letters from our readers, we also include in Mail.100 letters from CompuServe and The Source. Those message writers are identified by their CompuServe (CIS ID) or Source (STC ID) identification number.

ALKALINE BATTERY SOLUTION REINCARNATED

My solution to the 100 battery problem is to use the Radio Shack AA battery charger, but instead of using 1.25v rechargeable batteries, I recharge the 1.5 alkaline batteries. The recharger puts out 6.7 volts, enough to bring them up to the required 1.5 volts. They obviously will not last as long as new batteries, but you will always have a fresh set available. There is naturally the possibility of their bursting in the process so place the charger in the garage or another safe place.

N.D. McCarthy
Los Angeles, CA

I like your new magazine. The copies I have received have been most informative. In fact, learning about Businesspak+ was worth the price of admission. Now, a couple of comments:

I don't understand all the "hassle" about alternate power sources. I have been using General Electric nicads for the past several months and am very happy with their performance. In spite of the reports I hear about time restrictions, mine seem to be good for nine to 10 hours of constant use. I keep a spare set on charge for the next day, but my needs are easily met on a "normal" work day with just one set. I have the power limit set to 60 seconds so the unit will power down when I am doing research, talking on the phone, etc. However, on those days when I write "all day" the batteries still handle the job. It is a good thing, too, since I am often far from a wall outlet.

R. L. Lawrence
Pt. Hueneme, CA

IN DESPAIR OVER BOWLING PROGRAM

As a new subscriber to *Portable 100*, I wish to state that I am pleased with it and look forward to issues to come.

I hope you are open to remarks and suggestions from your readers for I have a couple of suggestions to make.

As somewhat of a novice, though I can write a simple Basic program, I encountered problems in copying the "Bowling" program in the October issue.

First, the typeset. Although very presentable, it was difficult when typing with the copy besides the computer to distinquish the faint tail on a comma. It looked like a period. The same was true for a semicolon and colon. Second, The 0 and O are the same and not in computer terminology. Also, there were typesetting errors. Line 120 had a space between the quotes where none should be and line 230 was missing. I found these bugs but not others (perhaps mine) and as of now the program does not

Message	Code	Meaning
AO	53	Already Open
BN	51	Bad File Number
BS	9	Bad Subscript
CF	58	File Not Open
CN	17	Can't Continue
DD	10	Doubly Dimensioned Array
DS	56	Direct Statement in File
EF	54	Input Past End of File
FC	5	Illegal Function Call
FF	52	File Not Found
ID	12	Illegal Direct
IE	50	Undefined Error
IO	18	Error
LS	15	String Too Long
NF	1	NEXT Without FOR
NM	55	Bad File Name
NR	19	No RESUME
OD	4	Out of Data
OM	7	Out of Memory
OS	14	Out of String Space
OV	6	Overflow
RG	3	RETURN Without GOSUB
RW	20	RESUME Without Error
SN	2	Syntax Error
ST	16	String Formula Too Complex
TM	13	Type Mismatch
UE	23	Undefined Error
UE	49	Undefined Error
UE	59	Undefined Error
UE	255	Undefined Error
UE	26	Undefined Error
UL	8	Undefined Line

Figure 1: Model 100 error codes in alphabetical order.

run properly. I hope you will publish corrections for these.

There is, of course, a solution to this which you could adopt. Namely, not to typeset the programs but rather to photocopy a list of the program printed directly from the computer. Tandy should also use this method. In one of their books a typseset program contained five errors!

I have one additional offering. This is a listing from the Model 100 manual of error codes. I have copied the list in alphabetical order, making it much less frustrating to translate the error codes that appear on the screen. Perhaps you could present this list to your readers and save them the anguish of searching up and down that numerical list.

Fred W. Forrester
Santa Barbara, CA

FEWER GAMES AND MORE INTERFACING

I'm no critic, but I subscribe to a number of magazines and consider *Portable 100* one of the better selections. Your readers not only have microcomputing in common, but have the Model 100 as a common microcomputer. If the magazine continues to cater to this select but growing number, I'm sure it will grow as well.

In my correspondence with other 100 users on The Source, I have yet to find anyone who owns the Model 100 as his only machine. Without exception, the 100 serves as a second computer. In my case, I use an HP-85 in my work as a mechanical engineer and bought the 100 for my personal use. I've found it to be a simple matter to exchange data and text files between the two machines. The 100 then serves as an electronic briefcase. On occasion, I've sent information from work to my Source mailbox and then retrieved it with the 100 at home. An expensive alternative to connecting the two machines with cables, but at least the procedure is painless.

The point I'm trying to make is this: Most of your readers will be very interested in "how to" articles about interfacing with their other computers. If you are a regular reader of the TRS-80 bulletin board, you must have noticed there are a great

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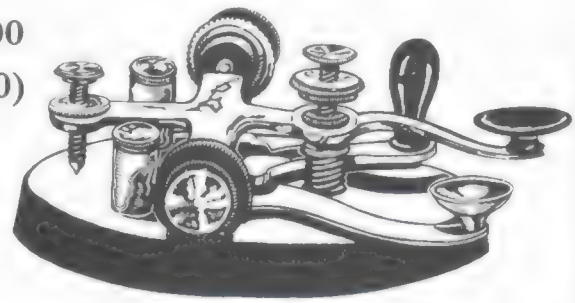

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Camden, Maine 04843

many users having trouble in this area. If you can get someone's attention at Radio Shack, ask him or her why the hell the Model 100 does not have a provision for the output of a line feed with a carriage return.

I would like to see your magazine go "one up" on the rest of the industry by offering an alternative to the published program listings by regularly making them accesible via the Source or CompuServe. The text of the magazine will obviously be required in order to use the programs, but keying in listings is very time consuming.

Finally, you are wasting valuable space in *Portable 100* by discussing games of any kind. It is my guess that most 100 users are adults, mostly professionals who have little use for articles about games.

Jim McBurnett
STC ID TCX803

JUST LEARNING — WITHOUT COMPANY'S HELP

I am having little success using the IBM graphic printer and the TRS-80 Model 100. IBM offers a brief pamphlet with its computer and their store is useless in helping. A Sears store offered to copy the pamphlet and Epson forced me into a high phone bill. I was surprised at the manual that comes with its printer; its thicker than the 100 manual.

I finally got a line feed only to have a character where I didn't want it.

I know I'm just learning, but the companies aren't a lot of help.

Dennis Stickley
Mars, PA

STORAGE A PROBLEM? TRY DISK SHARING

I read with great interest and catharsis Don Watson's article on cassette tapes in the November issue of Portable 100. For those who have never used anything other than a cassette, the problems may appear trivial, but until disk drives or wafer tapes are available, Mr. Watson's views are important to appreciate. In the meantime, I have another solution for those really long and important programs for the 100. Store them on another computer's disk. As David Busch suggested in his article on the VIC-20 and Model 100 in the same issue, other machines come in handy for utility work with the 100. Since I also have an Apple IIe with a disk system, I make longer and critical backups on it. I use my modems to transfer files, but the RS-232 port would work just as well. In fact, if you have a friendly Sysop on your local bulletin board, he or she may let you use some space there for critical program storage. So for 100 owners who have other micros with disk systems, you can avoid the worry of "cassette crash" explained by Mr. Watson.

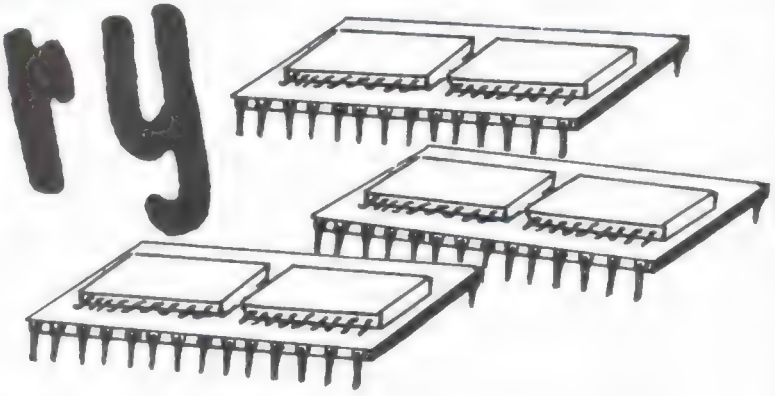
William B. Sanders
San Diego, CA

TANDY EXPLAINS CASSETTE BUG ERROR

As a result of a reader's letter to *Portable 100* (October 1983, page 10) a number of people are very concerned that Radio Shack has made

MODEL 100

Memory



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changes to the cassette circuitry to "fix" some error.

I'm not about to try to alibi and say that cassette tape is the most reliable storage media. However — I will say there have been *absloutely*, repeat, *absolutely* no changes made in any Model 100 since day one which might in any way change the cassette circuitry. We do not have a "series" of Model 100's below which they will not load a .DO file in excess of 10K.

Bill Walters
Model 100 Buyer
Tandy Corporation

SOUR NOTES FROM THE SUNSHINE STATE

After spending over four hours punching in and trying to run (unsuccessfully) the Music Machine program listed in the recent issue of the Portable 100 magazine, I was at my wits end. Each time I tried to run the program, I got more errors than a blind baseball team. Double, triple, and quadruple checking of the program listings and the song file I wanted to run turned up no discrepancies. Everything was consistent with the material listed in the article. My wife and cat were soon seeking safety in another room. (Being relatively new to programming, I'm not very creative and don't have the sense to alter the program to make it work.)

Also, the Avant Garde Book typestyle, as mentioned by another reader, didn't help things much. Program listings would be more legible if they were typeset in a different sans serif typeface. Perhaps Futura, Univers, or good old Helvetica. Preferably one that uses round colons and periods. Spacing between the copy elements could also stand to be increased a bit. Right now, its difficult to discern what is a space and what isn't. Typesetting the program listings is, however, a definite improvement over methods commonly used by other computer magazines. Don't stop, please!

Randy England
Ft. Lauderdale, FL

SLOW AND SURE BUT WANTS FASTER WAY

I'm very interested in what I note several others are — how can one use a microcassette-sized recorder with my Model 100. Having to use a standard-sized recorder defeats the purpose of the 100 and doesn't permit me to use both the 100 and the recorder to advantage; the larger recorders are a nuisance.

I would also be interested in an article specifically addressing how to couple my 100 to my Apple II+ for best results and ease of use. So far, being lazy, I've done it using two phone lines and two modems. Slow but it works and I don't get calls while I'm doing it.

Jim Hughes' article in issue 2 gives clues, but I really want something more specific, including the connections to be made. For example, can I somehow connect the built-in modem to the Hayes Micromodem or its board in the Apple II+? Or do I need another serial card.

Evans M. Harrell
Marietta, GA

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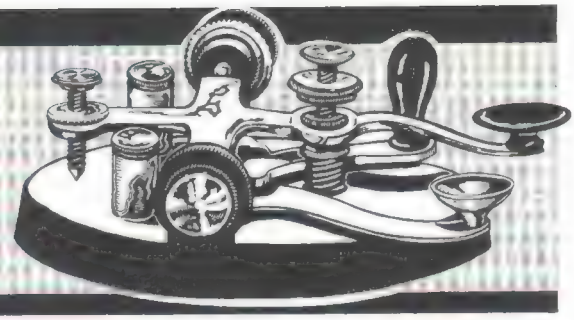
THE WIRE



TEST RESULTS SHOW 100 MEETS EMISSIONS BENCHMARKS

By JOHN P. MELLO JR.

An independent test of the TRS-80 Model 100 has determined the micro dosesn't exceed interference standards established by an advisory agency of the Federal Aviation Commission.

According of a copy of the test results obtained by *Portable 100*, the Model 100 "radiated emissions below the narrowband and broadband" limits defined by the Radio Technical Commission for Aeronautics, a quasi- governmental advisory agency to the FAA.

The tests — conducted by the Ford Aerospace & Communications Corporation in Palo Alto, CA, for the Tandy Corporation, distributor of the book-sized computer — were on a 100 running on battery power with no cables or peripherals attached. "Any changes or additions to the unit as tested would probably cause a change in the spectrum profile as measured," the test report said.

The tests on the 100 were conducted last September, just days before the Radio Technical Commission's executive committee set up a special committee — designated SC-156 — to "investigate potential interference to aircraft electronic equipment from devices carried aboard."

The commission's action was spurred by a letter from Eastern Airlines — an air carrier that's banned the use of computers on its aircraft — urging the panel get involved in the issue.

In a letter to the commission's chairman, Joseph Ortega, Eastern declared, "It is evident that the manufacturers of these devices are forcing the issue, but trying to determine which one will or will not cause interference with navigation or communication systems...is an endless and frustrating exercise."

Eastern added, "There is no question in our mind that [the commission] should get involved in this subject via a special RTCA committee and generate a minimum operations performance standard document against which manufacturers, marketing their products for airborne use, could test and label them as meeting this standard in a manner similar to the Underwriters Laboratory sign of approval.

"This would eliminate, or at least reduce, the burden and pressures we find ourselves under today."

A spokesman for United Airlines, another carrier banning portable computer use on its aircraft, explained:

"We just want to make sure they don't interfere with the communications and navigation systems on the aircraft, so we're not permitting passengers to use them right now until we've had a chance to check them out."

"As soon as we are sure they cause no problems, then we will permit people to use them again," he added.

Chairman of SC-156, Frank C. White, said he did not know how long it would take the committee, which began its fact-finding mission last month, to conclude its work. But he felt existing evidence showed small computers do not interfere with navigation and communication gear.

White told *Portable 100*, "There is no evidence of any serious problem at this time."

"Every evidence," he added, "indicates that the small, hand-held computers that don't print out are the smallest possibility of any hazard because of the small amount of energy they use."

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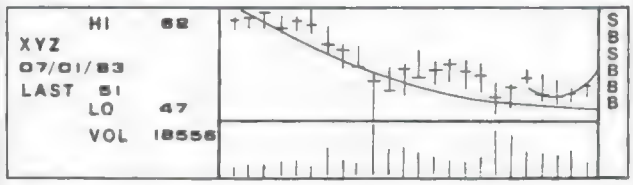

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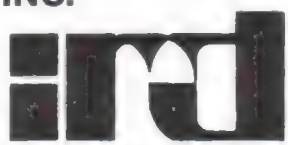

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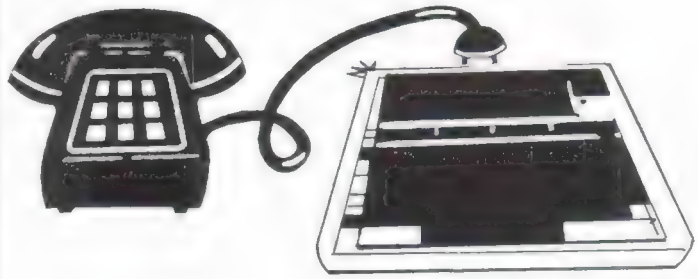
MODEM TARIFF

MODEM USERS GROUP WINS VICTORY OVER SOUTHWESTERN BELL



A group of Oklahoma computerists have fought the phone company and won. Southwestern Bell, after considerable flak from Robert Braver and his Oklahoma Modem Users Group, has junked a "tariff" enabling it to levy additional charges on customers hooking up modems to their telephones (*Portable 100*, October 1983, page 64).

According to Braver, "After January 1, Southwestern Bell in Oklahoma will no longer require its customers to obtain information terminal service if they use a modem."

"We decided to amend [the tariff]," said Jay Allen, public relations manager for Southwestern Bell in Tulsa, "because it was obsolete. It was written at a time when things were a lot different than they are today."

Under the old tariff, established in 1965, residential rates in Oklahoma ranged from $4.85 to $9.20 a month. But if a customer attached a modem to a home phone, Southwestern Bell hit him with an "information terminal rate," ranging from $21.15 to $49.90 a month.

Apparently the tariff remained on the books unnoticed and unchallenged until this spring, when a local bulletin board operator named Robert Braver tangled with Bell. He explained on CompuServe:

"Sometime in early May 1983 I requested that a tracer be placed on the BBS line. I had to explain the kinds of calls I was receiving, which meant that I had to explain that I had a modem. Bell already knew I had a modem, as I registered it with them when I first set up the BBS.

"They didn't do the tracer (at first) but they said that since I used the modem, I would have to pay the information terminal rate, which is about 500 percent higher than the normal phone rate. For several weeks I argued with the business office reps, telling them that the rate is only for high-speed lines. I couldn't believe that anyone could pass a tariff that would essentially outlaw non-commercial mo-

dem use in Oklahoma (who can afford to pay a 500 percent higher phone bill?)."

After his first skirmish with Bell, Braver formed the Oklahoma Modem Users Group to oppose the tariff and began drumming up national support for his efforts. His pitch: If it can happen in Oklahoma, it can happen in your state.

Braver's efforts bore fruit in November. When Southwestern Bell brought its 1984 rates before the Oklahoma Corporation Commission for review, the information terminal tariff had been abolished. Bell's Allen explained, "With times changing so much and this business going the way its going, we feel it's the most realistic way to go." ✔

—John P. Mello Jr.

THE PRICE OF TELECOMPUTING LIBERTY

Although the modem users' surcharge has been defeated in Oklahoma, *Portable 100* would like to remind its readers of an often quoted remark attributed to Thomas Jefferson: "Eternal vigilence is the price of liberty." With that in mind, we submit the following list of agencies regulating the Bell Operating Companies in the 50 states. The person named in each entry is the chairman of the commission.

Carolyn S. Guess
Public Utilities Commission
Dept. of Commerce and Economic Development
338 Denali St.
Anchorage, AK 99501

Neil T. Dimmick
Department of Utilities
Corporation Commission
1210 W. Washington St.
Phoenix, AZ 85007

Nathan M. Norton Jr.
Public Service Commission
Department of Commerce
400 Union Station
Little Rock, AR 72201

John E. Bryson
Public Utilities Commission
350 McAllister St.
San Francisco, CA 94102

Harry Galligan
Public Utilities Commission
Dept. of Regulatory Agencies
State Services Building
Denver, CO 80203

Thomas H. Fitzpatrick
Public Utilities Control Authority
Dept. of Public Utility Control
165 Capitol Ave., Room 573
Hartford, CT 06115

Robert J. Kennedy
Public Utilities Control
Dept. of Administrative Services
1560 S. du Pont Hwy.
Dover, DE 19901

Ford B. Spinks
Public Service Commission
244 Washington St. Room 162
Atlanta, GA 30334

Albert Q.Y. Tom
Public Utilities Commission
Dept. of Budget & Finance
1164 Bishop Street, #911
Honolulu, HI 96813

Conley Ward
Public Utilities Commission
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Boise, ID 83720

Michael V. Hasten
Commerce Commission
527 E. Capitol Ave.
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Larry Wallace
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State Off. Bldg. Room 901
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Andrew Varley
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Lucas Bldg.
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Richard C. Loux
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State Office Bldg.
Topeka, KS 66612

Martin Volz
Public Service Comm.
730 Schenkel Lane. P.O. Box 615
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Ed Kennon
Public Service Comm.
1630 One American Place
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Ralph Gelder
Public Utilities Comm.
State House, Station #18
Augusta, ME 04333

Thomas J. Hatem
Utility Consumer Advisory Panel
Public Service Comm., American Bldg.
231 E. Baltimore St.
Baltimore, MD

Doris Pote
Dept. of Public Utilities
Exec. Office of Consumer Affairs
100 Cambridge St.
Boston, MA 02202

Daniel J. Demlow
Public Service Comm.
Department of Commerce
6545 Mercantile Way
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Michael Love
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George H. Barbour
Bd. of Public Utilities
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Richard P. Montoya
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Bataan Memorial Bldg.
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Paul L. Gioia
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Rogert Koger
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Dept. of Commerce
430 N. Salisbury St.
Raleigh, NC 27611

Richard Elkin
Public Service Commission
State Capitol 12th Floor
Bismarck, ND 58505

Billy Joe Camp
Public Service Commission
State Office Building
Montgomery, AL 36130

David L. Swafford
Public Service Commission
101 E. Gaines St.
Tallahasse, FL 32301

William S. Newcomb, Jr.
Public Utilities Comm.
375 S. High St.
Columbus, OH 43215

Hamp Baker
Corporation Comm.
Jim Thorpe Bldg.
Oklahoma City, OK 73105

John Lobdell
Public Utility Commission
Labor & Industries Bldg.
Salem, OR 97310

Susan M. Shanaman
Public Utility Comm.
North Off. Bldg. Rom 104
Harrisburg, PA 17120

Edward F. Burke
Public Utility Comm.
Dept. of Business Regulation
100 Orange St.
Providence, RI 02903

Rudolph Mitchell
Public Service Comm.
111 Doctor's Circle
Columbia, SC 29203

Patricia de Hueck
Public Utilities Comm.
Dept. of Commerce
Capitol Bldg., 1st Fl.
Pierre, SD 57501

Frank Cochran
Public Service Comm.
Cordell Hull Bldg. Rm. c1-100
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John E. Cunningham
Public Utilities Comm.
7800 Shoal Creek Blvd.
Austin, TX 78757

Milly O. Bernard
Public Service Comm.
Dept. of Business Regulation
330 E. Fourth South
Salt Lake City, UT 84111

Louise McCarren
Public Service Bd.
State Off. Bldg.
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Thomas P. Harwood Jr.
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BILL WALTERS

TANDYTALK

DELVING INTO THE DARKEST REACHES OF THE MODEL 100'S MEMORY

Here I am at 35,000 feet flying along on American Airlines. The flight attendant has just stopped by, pointed to my Model 100 and remarked that it looked very interesting. "What's it do?" she asked. At least she didn't threaten to cut off my chablis and take away my Model 100. There goes my last excuse for not getting out this month's column.

SO WHERE ARE THEY? In my past two columns I mentioned products that should have been available by the time Portable 100 was in your hands. I've been taken to task quite briskly by some folks over this. The main problem? The items I mentioned, Basic Language Lab, Model 100 I/O documention, and the bar code reader, weren't available when the magazine hit the stands.

In point of meager defense, I mention new products only when I feel they will be available to our stores by the time the magazine is distributed. Please be aware, though, delays happen.

The only way around that is to keep my mouth shut and not mention anything new until it's safely on our shelves. Since part of the reason I was asked to be here was to share new information with you, I feel you would be disappointed in hearing about something which has been in the store for three to four months. My motive is not to tease, but to let you know we are working away here in Ft. Worth on projects concerning the Model 100.

SAN DIEGO. The 28th and 29th of September found me in San Diego at the Portable Battery-Powered Forum sponsored by Future Computing Inc. (see *The Wire, Portable 100*, December 1983). It was very well attended with representatives from every company currently offering products for portable computers as well as a number of large corporations seeking information on this explosive market. I was thrilled to look out over the audience and see so many Model 100s in use. You couldn't ignore that fact; you could hear the keyboards clickety-clicking away. I just have to get a more quiet keyboard! I promise you — I'll get moving on it and see what can be accomplished.

There were many rosy projections on the portable market. And more definitions of what "portable" really means. Several speakers steadfastly refused to give up using the term for non-battery powered units. Quite frankly, the vote is still very much "out" on this question.

Future Computing helped decipher the various classes of units by dividing the portable units into battery-powered and non-battery-powered. I thought it interesting they further divided the battery-powered segment into three sub-groups: briefcase, notebook, and hand-held. It says quite a lot when such a new segment already has to be divided into smaller parts. Needless to say, all parties (well, almost all) thought that briefcase and notebook type computers would be growing by leaps and bounds in the coming years. That's about the safest thing I've heard said since "Death is inevitable."

OPENING THE 100. I've gotten a number of calls about the use of memory inside the Model 100. Where are things located, how are they stored, what kind of shuffling goes on with files? The owner's manual doesn't say anything about it so let's see if I can shine any light on the subject.

Looking at the memory map (figure 1) from the bottom up, you see locations 0 to 32768 are taken up with the 32K Read Only Memory (ROM). This is a single integrated circuit containing all the programming that makes the Model 100 function, including the five built-in applications programs.

Now shift to the top of the memory map and you will see that an 8K unit has Random Access Memory (RAM) present in memory locations 57344 to 65536. Of these 8192 locations, a certain amount is reserved for use by the system. What is the system? Well, the main menu listing all of your files is part of that area. That list of names is kept along with pointers indicating the type of file it is and where it is located in memory.

Also in this system area is the eight-line buffer for TELCOM as well as the regular eight-line screen buffer.

The Model 100 also keeps other tidbits of information here such as what memory location to jump to in case of error, certain parameters such as WIDTH?, and current top of RAM available to all programs.

Each additional 8K RAM module adds 8192 bytes of memory and they extend downward, as illustrated by figure 1.

WHERE YOUR FILES ARE. Files displayed on your main menu are stored at the very lowest memory location and stacked on top of each other. Basic program files are stored at the very bottom and text files sit right on top of them. Machine-language files, should any be saved in the file storage area, are located last.

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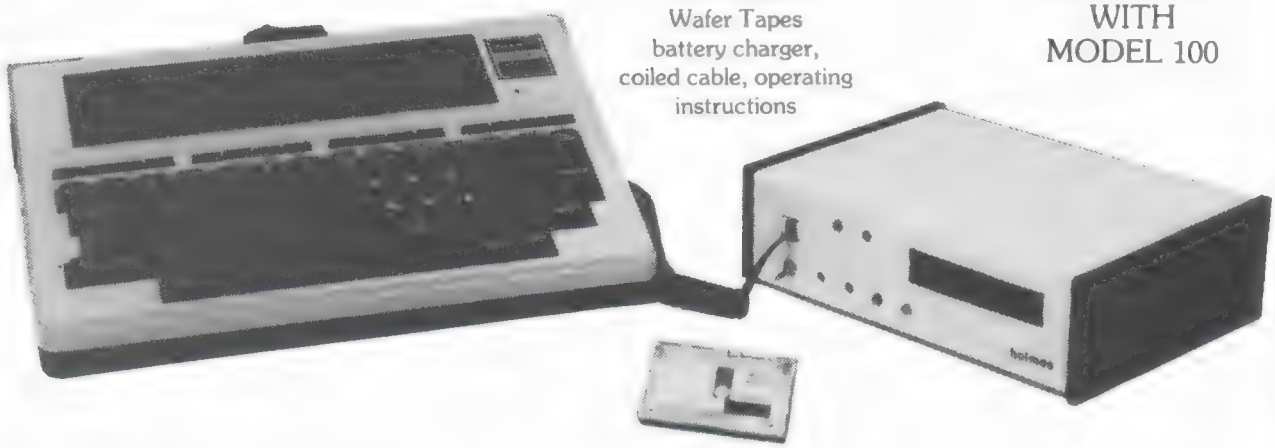

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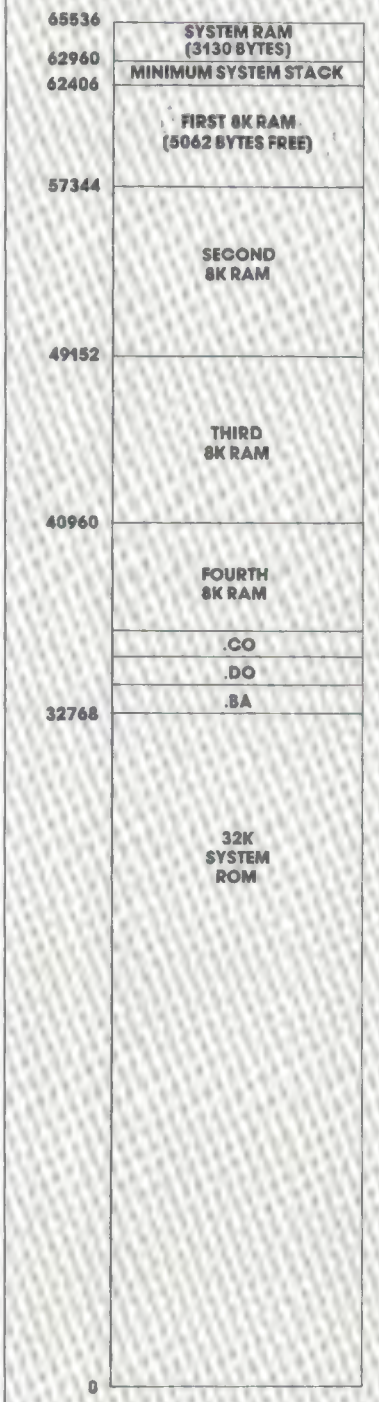
The area of memory between the top of the very last file and the bottom of the system area is termed the working storage area. This area is used by Basic when you execute it and begin writing a program. You can always find the bottom of this system area by entering Basic and typing: PRINT MAXRAM and pressing enter. This gives the answer 62960 which is the highest RAM address available to any program.

An 8K Model 100 with nothing in it will display 5062 bytes free. A little quick arithmetic shows there are 554 bytes "missing" since 65536−62960 =3130.

Where are the missing 554 bytes? Right below the bottom address of the system is an area called the "minimum system stack". It is required but not fixed as part of the system area, because it can grow larger when Basic is executing, since this is where string space and file buffers are located. You can find the top address of this area by typing: PRINT HIMEM. Initial power-up (first time ever or "cold start") sets HIMEM = MAXRAM, since there is no reserved area set aside.

Figure 1. Model 100 Memory Sketch.



MOST PRECIOUS ASSET. Since memory is the most precious asset the Model 100 has, you need to understand where things are being located to help you decide how you will use the resources available. For example, if you have a machine-language program using 2000 bytes, when you load it in from cassette it will load into place from wherever it has been saved. If I do the following:

```
CSAVEM "TEST" 60406,62406,60406
```

I will save 2000 bytes of information onto cassette tape (62406 − 60406 = 2000). When I load it with CLOADM "TEST.CO", I will see:

```
FOUND TEST
START:60406
END:62406
EXEC:60406
```

and when the tape stops that file will be loaded into locations 60406-62406. "But," you say, "I thought you said this was the area Basic and other

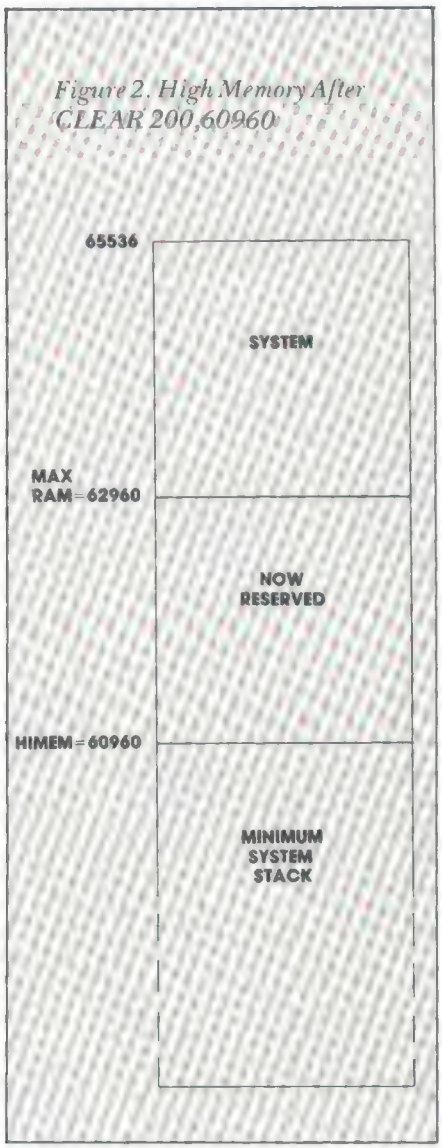


Figure 2. High Memory After CLEAR 200,60960

programs used for working storage? Won't it erase or overwrite this file?". Yes and no.

The clear command has two arguments. That is, there are two numbers which may follow the command. The first sets aside a specified amount of space for storage of string variables. Please bear with me if I don't fully explain string variables. That is another subject entirely; if you don't know what they are, relax, it's not really important to understanding memory usage.

The second argument is used to set *the maximum RAM address available to all applications* (see figure 2). This means you may tell the unit to save any amount of memory you wish. Remember, though, this takes away from overall memory. So, to protect my machine-language file from being corrupted, prior to loading it I would do the following:

```
CLEAR 200,60960
```

This command sets HIMEM = 60960 and forces the "minimum system stack" area to move below this value. Literally, this tells the Model 100 I don't want it to use memory between 60960 and 62960, and it won't. Okay so far?

INVISIBLE FILE. Well, after loading my machine-language file into high memory, it's in the machine, but I don't see its name on the menu. That's right because the menu only displays names of files *stored in the file storage area of RAM*. You'll remember that the file storage area is the lowest address of RAM. If you want to create a copy of your file to be placed in the file storage area you can do so. SAVEM "TEST.CO" 60960,62960,60960 will copy it and tuck it away in the file storage area.

The $64,000 question is, "Why all this fiddling around with machine-language files? Why aren't they treated just like Basic and TEXT files?" The answer is because machine-language files are different.

Basic program files are executed where they are stored. The Basic interpreter in ROM is simply told the starting address of the file (from the pointers maintained in the system area) and uses this to thread its way through and interpret the program. Basic, remember, always uses working storage beginning just below the reserved system area for its stack and variables. Machine-language files, however, cannot work this way. They must be placed at a fixed location in memory or they will not function. If you save a copy of your machine-language program into your file space, to get it to execute you would need to do the following (assuming you have not yet set CLEAR):

```
CLEAR 200,60960
LOADM "TEST.CO"
CALL 60960
```

This sequence protects the destination locations from Basic or other programs, causes a copy of TEST.CO to be placed into locations 60960-62960, and jumps to location 60960 for execution.

DUPLICATE FILES. The key to remember is, whenever you save a copy of a machine-language program into your file storage area you cost yourself the amount of RAM the program occupies in additional storage. In my specific example above, after executing the LOADM command, you have two copies of TEST.CO in the Model 100. One in the file storage area, the other at the working location.

To conserve memory, if the machine language-file you are loading is one you want to keep in your unit, use the CLEAR command to reserve the exact amount of memory needed and keep your program there. If you have two or more machine-language programs located at the same addresses and you want to have them both available, then you will have to accept the expense of duplicate copies in memory. The best solution is to have them written so the second one begins where the first ends. This is easier than it sounds, as most commercial machine-language programs expect to be the only one being used at any one time.

Since the machine-language program doesn't occupy directory space and can't be seen, how does it execute? Easy. Write a simple one line Basic program that calls the beginning address of the program and just save it as a regular Basic program. For the example I used, the one-liner would be:

```
10 CALL 60960
```

and I would have saved it as "TEST.BA". If you really wanted to get fancy, you could have it tell you what it was about to do and ask if it was okay. But that's programming technique and a subject matter for another day.

Please remember, if you have any specific areas about Radio Shack or the Model 100 that you'd like to have discussed here, just drop me a note, care of *Portable 100*.

HOW TO INTERFACE WITH SMALL RECORDERS

One reason the 100 won't work with small tape recorders is many don't have aux input. Here's a hardware solution to the problem.

By PAUL E. ANDREASEN

If you are a proud Model 100 owner, you already know that Tandy's newest kid is more than welcome on any block (unless it's the one Epson lives on).

However, as nice as it is to be able to carry this miniature system around with you, it's not so nice to have to carry around a tape recorder almost as big as the computer.

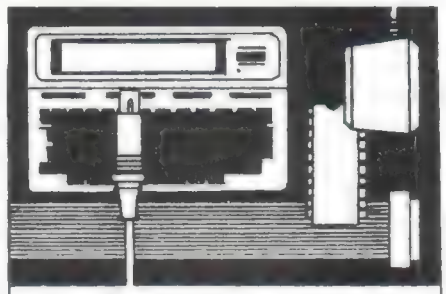
The reason you have to use a full-size recorder is:

- They are usually the only recorders that have an auxiliary input; and
- They have a full volume audio output that will adequately drive the Model 100's input circuitry.

MINISETTE-9. Wouldn't it be nice to be able to carry a Radio Shack Minisette-9 or a microcassette recorder without having to modify the computer or the cassette device? You can — even if you're not normally on good speaking terms with a soldering iron or other tools.

The problem is twofold. If you find the small recorder with a good strong volume that doesn't waver or produce a lot of noise and static (deadly to digital signals), then you are half way there.

Now you have to deal with output from the 100. It's usually 2 to 2.5 volts. That's a lot of signal, but the auxillary inputs of most recorders handle anywhere from 1.5 to 4 volts — sometimes even more, when equipped with automatic record level circuitry.



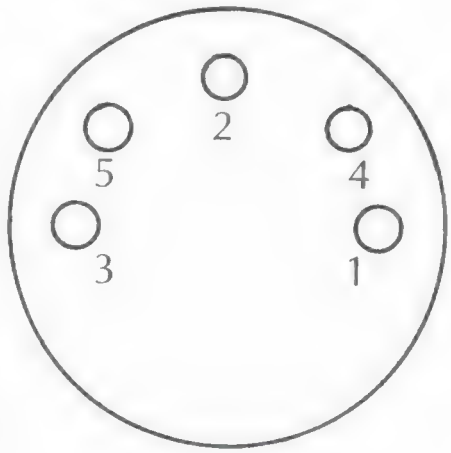
HARDWARE

INPUT OVERLOAD. But remember, though, most small recorders don't have an auxiliary input, so you have to use microphone input. The level of signal input the microphone expects is on the order of of .05 to .5 volts, considerably less than the 2-plus volts coming from the 100. In fact, if the recorder doesn't have a good input protection circuit, it won't duck, it may just drop dead on the spot.

And for those of you thinking creatively right now: No, you can't depend on the input protection to clamp the signal to the proper. All you will do is overload it, and cause distortion, if not damage. Distortion, for our needs, is almost as bad as damage.

I know some Model 100 owners have been using the Minisette-9 or other small sets with up to 80 percent reliability. Well, I use one with 100 percent! I have loaded files as long as 20K just to test it, and unless I get the volume turned all the way down (embarrassing when your family is watching the so-called-expert), it never has failed me.

Ready now? Here comes the list of terribly expensive, exotic, hard-to-find parts you'll use to modify your cassette input signal: one 5.6 megohm resistor. It should cost you all of 25 cents — even if you buy it from our favorite overpriced parts mart.



FINGERNAIL POWER. Take the the black plastic cover off the connector that plugs into the computer. If you aren't familiar with it, look on the side and you will see a little square plastic tab. This has a protrusion or step on the bottom that is tucked down into the metal body of the connector. Gently pry this up. Use your fingernail. That way, you will hurt before it does. When the step is out of the hole, slide the cover back along the cable. (Be careful not to pick it up anymore than necessary or you will deform it and cause problems keeping it together later.)

Half the metal connector shell will fall off, causing instant paranoia among the non-hardware types. Don't fret, it is keyed to the other half. I don't think you could get it back together wrong if you tried. (Scratch that, I could put a pencil in the sharpner.

Now get your soldering iron ready (small ones, 25 watts or less)! Take the connector and hold it in a small vise (gently) or have someone else hold it so the pins point to the right and form an upward arc. Starting

with the pin closest to you, the pins are numbered 3,5,2,4,1. The second pin is number 5. (I know it's number 2, but they call it number 5, and the number on the body proves it. No, Tandy didn't think of it. It's just SAC —Standard American Confusionism.)

DESOLDER PIN 5. Pin 5 should have a red wire attached to it. Unsolder this wire from the connector pin. Be careful not to break the wire or leave the iron on the pin too long so the heat melts the plastic body of the connector.

Take the 5.6 megohm resistor and cut the leads, so they stick out 1/8-inch or so from each end. Solder one end to the end of the wire you removed.

Now slip on a piece of wire spaghetti, shrink tubing, or just a small piece of tape, leaving just the unconnected end of the resistor sticking out. Solder this carefully to the connector pin you removed the wire from.

FINISHING TOUCH. Bend the resistor carefully until it is flat along side the other wires. And make sure it isn't shorting out against the shell or another pin. Reassemble the metal shell of the connector, making sure that the little alignment tabs are in the notch on the other half of the shell, and slide the plastic cover into place. Push the square plastic tab down so the protrusion on the bottom will stick in the hole just slightly and hold properly.

You are done!

The cable now provides an output of from 100 to 500 millivolts, according to your Model 100's individual output circuitry. This should work in almost any recorder's microphone input without harming it or creating distortion. I have tried it in almost a dozen different recorders from a little $16 pocket model to a dictating machine costing $300. They all work swell.

If the recorder works, so will the cable. Welcome to the world of the hardware hackers. You've only just begun, because modifying things is addictive. You just have to try one more thing, and pretty soon your set will cringe when you approach it with a screwdriver. Mine just flips on its back and spits out all its screws to save time.

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WILL THE INFORMATION REVOLUTION LEAVE OUR NASTY NEIGHBORS BEHIND?

Maybe Orwell didn't need to worry. Maybe 1984 brings us higher hopes than we'd have thought 10 years ago.

Orwell painted a pessimistic picture of the future, but he didn't know about the revolution to come, the one we're enjoying the fruits of as they're harvested right now.

This month's musings were inspired not so much by the Model 100, but by the whole microcomputer phenomenon in general. As an added motivation, I've been spurred on by our neighbors. You know them. That bunch of weirdos who do things like shoot passenger planes out of the sky for flying over their land. Weird lot. And manifestly dangerous.

NASTY NEIGHBORS. I have this theory. Back on the nice side of the fence, things have been happening, things the nasty neighbors can't possibly take part in because they buy Big Brother's values. Microcomputers, of course, are those things and the consequent revolution being brought about involves a new technology — information technology.

Now on the other side of the Iron Curtain, information isn't something shared by all. It belongs to a privileged few who guard its use as they see fit. It would never do to have so much data outside the state's control.

Currently, those weird neighbors have become very powerful and can wield large and sophisticated sticks to protect their self-perpetuating system — just the way George Orwell perceived it. That power, however, is based on something the Western World actually shared with the communist bloc — the Industrial Revolution. Without that, there would be no communism (how can you have communism without a proletariat?), and the standard of living we enjoy would probably be lower.

HACKNEYED BUT TRUE. Now we have a new technology and a very different revolution taking place. I feel I should apologize for the constant use of the word "revolution". It's a term that's becoming hackneyed in analyses of the microcomputer's emergence into everyday life. But, revolution it is, with repercussions as far-reaching as the coming of the printed word. It's no coincidence the nasty neighbors have even that under control.

The next step — allowing a nation to become computer literate — is an impossible one for them. How on earth could a computer censor work? Most people are aware of the computer term "GIGO," garbage in garbage out. How appropriate that is for the government data manipulators. (Maybe that would be an accurate description of a Russian computer.) The machinery describing a scheduled passenger plane as a spy plane is using a different technique: TIGO — truth in garbage out.

Can you imagine that same state-machinery dealing with truth in the hands of thousands of micro owners? And all of it being manipulated by miniature computers that practice truth in truth out.

TRAPPED IN THE PAST. So while the USSR is what it is by virtue the Industrial Revolution, the next important revolution is about to pass it by. As knowledge and information technology flourish and increase living standards in the West, the Soviets going to be stuck. It'll be the equivalent of a nation missing out on the Industrial Revolution and being caught in a feudal society.

It's not easy to predict the future, but a few things are already apparent. Among the glittering prizes are a few touted before.

A migration away from the cities and a greater opportunity to work from home. Imagine what this may mean to choked road networks and to wasted fossil fuels. To overcrowding and the unfortunate degeneration of inner cities into ghetto areas. To entire lifestyles.

How about the opportunity to share the wealth generated by our electronic slaves?

How about the development of robot intelligence in conjunction with microprocessor technology?

FIFTH GENERATION. Even the fact Japan missed the boat in the huge consumer electonics market will produce exciting results. Having missed out on all four computer generations (mechanical, tube, transisistor, and integrated circuit), they are sensibly concentrating on the next step. It's their intention to beat the rest of the world with the theoretical extrapolation of all that's gone before — the fifth generation computer.

These formidable machines will be the closest yet to the concept of an electronic brain. Using techniques called knowledge engineering, the fifth generation will intrinsically know such things as the shape of an airplane or car and be able to draw inferences from such data. It'll be the closest yet to a thinking machine.

The future looks really bright. I can't wait. It's already becoming impossible keeping pace with the momentum the technology has gained. And those poor nasty neighbors. They're about to be marooned in the industrial age while we sprint ever onwards.

Don't worry George, 1984 doesn't look so bad from where I'm standing.

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BIG BROTHER ISN'T WATCHING ANYONE — YET.

Well, it's finally 1984, the year of George Orwell's "Big Brother." Have you seen him? Don't look for him in the nation's public data bases — not yet, anyway.

Grouped under the umbrella "videotex," these services, which dispense information like soda pop, have appeared worldwide.

In the United States, there's CompuServe, The Source, Dow Jones News Retrieval Service, BRS, Delphi, and NewsNet. In Great Britain, there's Prestel; in Canada, Telidon; in Japan, Captain. The government-owned telephone company in France is giving away hundreds of thousands of terminals to access its national telephone directory called Telematique.

WAR GAMES. But "Big Brother" has not materialized from this fast growing industry. In fact, rarely does one information service talk to another. However, events last summer may change all that.

Since the box office success of *War Games*' — the movie about a teenage hacker bringing the world to the brink of nuclear war — many information services have become prime targets for vandals attempting to break in, harass, and otherwise pilfer data from computer data bases. Like the adolescent in *War Games*, these teenagers show a moral and ethical ignorance of their actions. But, this shouldn't surprise anyone, considering the reaction of most people when they hear a computer system's been crashed.

CUTE CRIME. Recently a teenage boy was summoned to Washington to answer why he broke into a cancer research data bank and destroyed several thousand patients' records. "When did you realize that gaining unauthorized entry into this computer and destroying valuable documents was morally or legally wrong?" one senator asked the boy. The young man grinned and responded, "When the FBI knocked at my door." As I watched this on TV, I was astonished by the audience's response to the exchange: They laughed.

Is the theft or destruction of computer data "cute?"

Many critics of videotex and computer data bases say if 'entry' is too easy, computer companies get what they deserve. I suppose they have a point. If I left the front door to my house unlocked and went next door for a minute, I would be guilty of inviting someone to enter my house and steal my TV set.

HACKER-VANDALS VEXING. Because most information services today are fairly secure, most hacker-vandals are little more than an annoyance to a system. But while their actions may be relatively insignificant, the system operators' perception and reaction to those actions could have ominous significance.

Break-in attempts may attempt competitive information services to form an alliance to protect themselves. The terms of this alliance would affect all of us, but especially Big Brother.

If you were a system operator, how would you handle these problems:

- A subscriber places a copyrighted program on a national data base to allow his friends to obtain unauthorized copies. Do you produce the name of the subscriber to the owner of the copyrighted program?
- What if the subscriber advertised for sale 5,000 M-16 rifles to anyone wishing a private army? Would you provide his or her identity to the federal authorities?
- You uncover information that an individual had a method of defrauding your competitor? Would you pass the information along?
- What if a user read someone else's electronic mail? Should electronic mail be treated the same as the U.S. mail?

PHONE PHREAKS. In the past we have thought of hacker-vandals as naive whiz kids just trying to expand their knowledge. In fact the reverse is more often the case. There is actually an organized group dubbed "Phone Phreaks" that delight in unauthorized use of the Bell phone system and breaking into computer systems nationwide. The Phone Phreak organization has been in existence for over 10 years and has its own computer bulletin board in New York. Would you protect members of this group using your system for off-color purposes?

I'd be interested in hearing your comments on this subject. Drop me a line c/o *Portable 100*, 67 Elm St., Camden., ME 04843.

And while you're at it, maybe you can let me know who is Big Brother watching? I haven't seen him yet, have you?

Bill Louden is the product manager for personal computer services for the CompuServe Information Service. He sponsors the Model 100 SIG on CIS.

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AS THE DUST SUBSIDES, 1983 APPEARS TO BE A MEWS YEAR

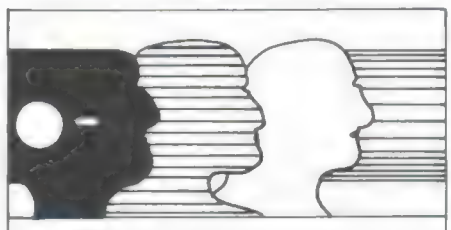
This time last year, *Time* declared the microcomputer "machine of the year." This year, we nominate the 100 for that distinction.

By JOHN P. MELLO JR.

Time magazine stirred the sensibilities of America in 1982 by chucking its annual "Man of the Year" award for a vaguely unsettling cover suggesting 1982 belonged to no man, but to a machine — the microcomputer. With that in mind, *Portable 100* submits (with an admitted degree of prejudice) its candidate for machine of the year in 1983: the TRS-80 Model 100 Micro Executive Work Station.

Since its introduction last spring, the Model 100 has captured a lot of ink — and covers — in the trade press. One of the first business writers to sing the praises of the 100 was *The Wall Street Journal's* Richard Shaffer, who started a whole genre of Model 100 stories. You've probably OD'd on them by now. They begin: "I'm writing this at 35,000 feet...."

Eight months after his first meeting with MEWS, Shaffer remains enthusiastic about it. "I'm still very high on the machine," he said in a telephone interview. "That's not to say I can't think of improvements on the machine, but it fills a lot of needs that I have."



In praising the 100, he placed it in some impressive company. He said, "I think it's a milestone machine in the same sense the Apple II was a milestone, the IBM PC was a milestone, VisiCalc was a milestone."

WINNING PRODUCT. "The product is essentially a winning product," observed Clive Smith, an analyst with the Yankee Group, a Boston-based market research firm. "I think the Model 100 has been an extremely successful product."

John Hemphill, senior technology consultant with Future Computing, a market research firm in Richardson, TX, added: "I think [the 100] is important because it is one of the more full-function, book-sized computers to come out. Prior to its introduction, there really wasn't an equivalent machine covering that segment — at that price point."

"It signified," Smith noted, "the opening of another important niche market, something between the handheld and the portable."

Although the halls of microdom resounded with praise when Tandy introduced the 100, not everyone was impressed. "A lot of people said, 'What are people going to use it for?'" Hemphill observed. "It's popularity has obviously shown us that the people that buy these things are smart enough to understand how to apply them."

SKEPTICS. But the 100 still has its skeptics. One of them is Jonathan Sacks, a staff writer with the *Miami Herald*.

He wrote, "The question nobody ever seems to ask as technological gimmickry barrels forward is: What use will people have for this stuff, anyway?"

"Big companies with names like Tandy...Epson...Sony and Hewlett-Packard must know what they're doing," he continued. "If nothing else, they are cashing in on modern man's love affair with gadgetry."

Sacks went on to describe an ad with a man in the backwoods word processing. Now you can word-process anywhere, the ad said. Anywhere.

"People have, for many years, been able to word process anywhere," Sacks observed. "Notebooks and pencils have always been completely portable — and far cheaper than computers.

"Furthermore, even though we always had the capability to word-process our hearts out in woodsy settings, most of us preferred places with desks and telephones."

BELLY-FULL OF 100. Sacks wasn't alone in his skepticism. Steven Levy, who writes a telecomputing column for *Popular Computing*, had had a belly-full of the Model 100 before he got his hands on one.

"Normally calm people burst into song when they told me about their new Model 100's," Levy wrote. "The archetypal experience has them sitting in a plane, slyly pulling the computer out of a briefcase, and casually typing in something using the TEXT program.

"Without fail, a crowd gathers — even highfalutin first-class folk drift by to see this wonderful lap-size, full-keyboard, three-pound computer.

"By the end of the flight, the Model 100 user has made 14 business contacts, 12 new friends, and a date with the stewardess."

Levy doubted all of it. Determined to find out the truth about the 100, he requested an evaluation unit from Tandy and vowed to "be tough, cynical, and generally testy."

"This attitude lasted about four seconds," the columnist wrote. "When I took the Model 100 out of the box and held it in my arms, my cold heart melted. It was cute!"

HARD-BOILED BEEPER. Levy wasn't the only hard-boiled computerist charmed by the Tandy's lap-sized offering. "I first laid my hands on a TRS-80 Model I back in 1978, wrote Mahlon G. Kelly in *Byte*, "and I was amazed at what it could do. It seemed obvious to me (and to many others) that the microcomputers that were then appearing...would revolutionize how many of us do our work...

"I have used more than 20 brands of microcomputers. All had their advantages and disadvantages and most did what was expected of them, but none excited me like the first generation — until now. The excitement is back: the TRS-80 Model 100 is the precursor of another revolution."

Kelly said he believed "the Model 100 is one of the best microcomputers ever made." The 100, he noted, "can do things that desktop microcomputers of several times its price cannot." But the most telling test of the 100, he added, is "that since I bought one, I have cut my use of larger machines by about half."

BREAKTHROUGH MACHINE? Is the 100 really a breakthrough machine? That's the question John J. Anderson asked in *Creative Computing*. "There has been quite a bit of brouhaha of late concerning the TRS-80 Model 100 computer, and you perhaps remain wary. Judging from the hype concerning the product, passed off as journalism by some other periodicals, you are hardly to be blamed...yet the coming impact of the machine (safely assuming that prices will quickly fall) should not be

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underestimated...just as the introduction of the Model I was a pivotal industry story of the 70s, it is highly likely that the introduction of the Model 100 will be a pivotal story for the 80s."

Why pivotal? Because the 100, more than any other micro, has the potential to bring *useful* computing power into the eyes and hands of society in general.

"There is a recurring phenomenon when you carry [a 100] around," Levy wrote. "Because the computer is so portable, Model 100s are often seen by people who don't normally come in contact with computers. Their reaction is less likely to be wonder at the fact that a useful computer is so compact than a generalized fascination with computer technology itself."

An editorial in *InfoWorld* added, "These tiny tykes go a long way toward the vision, which we have all been touting for the last several years, of everyone using personal computers. The concept of computing power at our fingertips is coming

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to fruition, as did that of affordable pocket calculators."

InfoWorld went on to say: "There is some special significance to the emergence of the lap computer. One of the primary complaints about the technological boom, which encompasses personal computing, is that the relatively high cost of the equipment has made computing power a privilege of the middle and upper class. With a complete computer, capable of business functions, now selling for less than $1000, this criticism is no longer valid."

A ROVING COMPUTER GATHERS SOME INK

Here's a sampling of the coverage the Model 100 received during its first eight months on the market.

Ahl, David H., "Benchmark Comparison Test", *Creative Computing*, pg. 259, November 1983.

Ahl, David H., "Easy Plotting on the TRS-80 Model 100 and NEC 8201", *Creative Computing*, pg. 264-266, November 1983.

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Freiberger, Paul, "Software support group backs the Radio Shack Model 100", *InfoWorld*, Vol. 5, No. 37, pg. 3.

Grazier, Jack, "New portable computers change the daily grind of beat reporting", *Editor & Publisher*, pg. 26-29, July 2, 1983.

Hedberg, Augustin, "Get Ready for the Lovable Luggables", *Money*, pg. 154-158.

Iocolano, Mark, "Machine Language", *Photo District News*, pg. 32, September 1983.

Kelly, Mahlon G., "The Radio Shack TRS-80 Model 100", *Byte*, pg. 139-162, September 1983.

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Louden, Bob, "Flying high with Radio Shack's TRS-80 Model 100", *InfoWorld*, Vol. 5, No. 25, Pg. 14.

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Markoff, John and Paul Freiberger, "Microsoft's Japanese connection, Kazuhiko Nishi", *InfoWorld*, Vol. 5, No. 35, pg. 28-33.

No Name, "Radio Shack races into portables", *Portable Computer*, pg. 73, April/May 1983.

No Name, "New portables fit in a briefcase", *InfoWorld*, pg. 56.

Sacks, Jonathan, "Does Small and Useless Beat Big and Useless?", *Miami Herald*, Living Today Section, July 9, 1983.

Sandler, Corey, "The TRS-80 Model 100: Never an Idle Moment", *PC Magazine*, Vol. 2, No. 1, pg. 194-199, June 1983.

Stewart, George, "The TRS-80 Model 100", *Popular Computing*, pg. 86-89, 156-165, May 1983.

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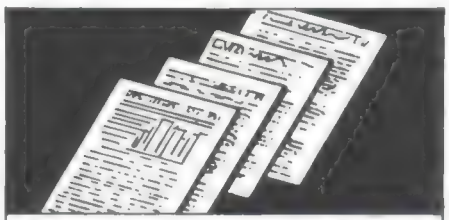
NEC VS THE MODEL 100: BATTLE ROYAL IN THE NOTEBOOK MARKET

How NEC's 8201A stacks up to the 100 in knee-to-knee competition.

By DANNY GOODMAN



REVIEW

A week or two before Richard Shaffer wrote the first hands-on Model 100 review for the March 25, 1983 *Wall Street Journal*, NEC was escorting its Japanese PC-8201 portable computer on a private American tour. The machine had already been available in Japan since January. In September, the company released its American version, the PC-8201A, with flashy ads showing it winning comparisons against the Model 100 in almost every category. Is the NEC better?

I've been using an NEC for over a month side-by-side with my Model 100. They are similar in many respects, but I offer these observations of their differences.

PHYSIQUE. The PC-8201A is the same size as the Model 100 except in one dimension: height. Instead of the mostly flat form factor of the Model 100, the PC-8201A has a more pronounced slope to it, rising to a peak 5/8 inches higher. The benefits are minimal, and mostly in the keyboard rather than the display. The keyboard receives a better front-to-back contour, more like an electric typewriter.

But, while the display should be easier to read at the increased angle, I've discovered readability is more a function of surrounding conditions. For example, if you use the computer on a desk facing a window, the light coming in from outside provides better contrast on the Model 100 display since more light is reflecting off the rear surface of the LCD. But if you use the computer against a light-colored wall, then the PC-8201A's increased angle reduces glare from the plastic screen. With either machine, you learn to adjust the computer to fit the lighting environment — one of the benefits of a computer you can move with one finger.

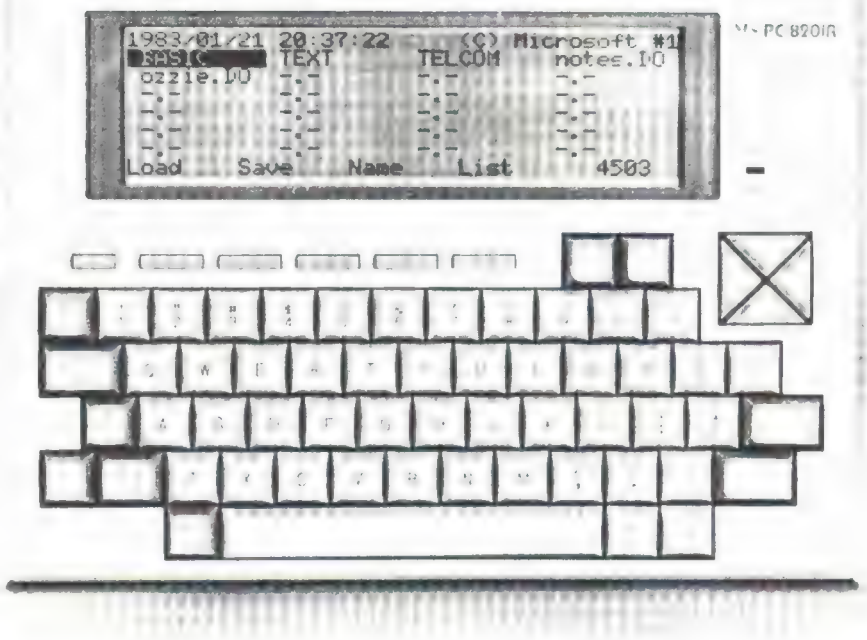
KEYS TO ITS HEART. Over the years, I've learned a computer keyboard is a very personal subject. One user's delight is another's horror. With that foreword, I'll state I take strong exception to several elements of the PC-8201A keyboard layout. Sure, all the letters and numbers are where they ought to be, but much of the punctuation I use is not. Now, "ought to be" for me is where I expect to find these keys on an IBM Selectric typewriter or IBM Personal Computer keyboard. The PC-8201A key layout is fashioned more like many Japanese computer keyboards I've seen, including NEC's PC-8800 professional personal computer.

Pay particular attention to the locations of the colon, quotation, apostrophe, hyphen, and parentheses. And the backspace key is not in its customary corner. For an experienced typist, these locations are nonstandard. If the PC-8201A is to be your only computer, then perhaps this is not a critical consideration. But the hazard exists for those who switch back and forth from portable to desktop computers. The differences in keyboards will slow you down on both.

One other negative feature of the PC-8201A keyboard is that the enter key is not big and fat like on the Model 100. Any good typist with flying fingers will prefer the larger key.

All is not gloomy on the NEC keyboard, however. The cursor key cluster is definitely its high point. Four

The Main Menu
When you power up the 820AA, the menu looks like the 100's.



triangle-shaped keys control the cursor in an intuitive diamond arrangement. They come in extra handy because the PC-8201A employs full-screen editing for Basic programs (in addition to EDIT-type editing), so the ability to move the cursor around quickly (without having to look at the arrows to see which key goes where) speeds some operations.

TEN KEY FUNCTIONS. Function keys are another of those personal areas in computer design, but I believe novice computer users are better off with them than without them. Now the question is whether 10 of them on the NEC are better than eight on the Model 100.

First of all, it is important to know that on the NEC you get 10 function keys from five buttons by using the shift key for functions 6 through 10. The benefits of having 10 keys in this arrangement include longer key legends on screen (up to six characters vs. Model 100's four) and two additional one-key functions. But after using them, I'm not sold on the 8201A's system.

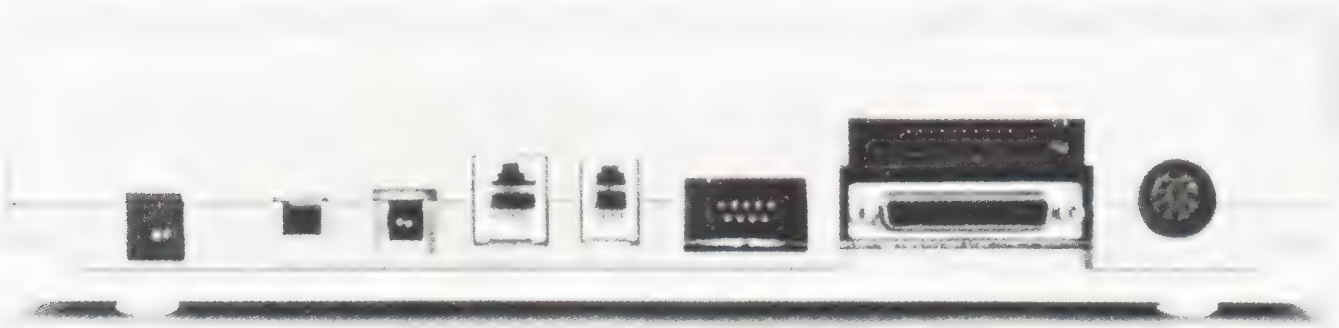
Whenever you press the shift key, the screen changes to display legends for F6-F10. This is distracting in some applications, especially TELCOM and typing Basic programs. Secondly, the exit key, MENU, is configured in all built-in applications as F10 – shift-F5. To exit any application, then, you have an inconvenient two-handed key sequence. And third, Basic programmers will be disheartened to know there is no event trapping (ON KEY GOSUB) available for the function keys. So, while you can redefine the legends for all keys, function keys will work only if you build them into a program at input junctures.

GIANT RAM. After you've worked within the Model 100's 32K RAM limit, the PC-8201A's expandability to 96K is inviting. Here's how it works.

At no time do you have more than 32K of RAM available to you. This is because the 80C85 microprocessor inside can address only 64K of memory, and 32K of that is already accounted for in the ROM. To compensate for this, the PC-8201A switches among 32K banks of RAM. Bank 1 contains the first 16K that comes with the machine. Additional 8K RAM chips can bring that up to 32K. More chips (also 8K) can begin filling up Bank 2 inside the computer, for a total of 64K RAM onboard. A cartridge slot on the unit's left side, accommodates one 32K CMOS RAM cartridge at a time, comprising Bank 3. You can use the Bank 3 cartridge even if you have only 16K onboard.

Switching from bank to bank is accomplished in the menu mode with F10. Each time you press this function key, the computer cycles to the next available memory bank, dis-

Action at the Rear. *The 8201A has all the ports the 100 has and more.*



plays the bank number at the upper right corner of the LCD, and displays the files in that directory plus the ROM program files. Cassette-based programs (see side bar) supplied with the PC-8201A provide utilities for backing up one bank into another, or for transferring a file between banks.

While it's nifty to have 64K of memory onboard, the real excitement with the NEC is the RAM cartridge. It is powered by a small non-rechargeable lithium cell battery, which must be replaced every six months or so. As long as you have more RAM cartridges to plug in, you can keep filling them up with text or program files. In essence, then, your RAM is limited only by the number of cartridges you have. Each one acts like a low-capacity, high-speed disk drive or other storage device. You could literally write a book on the NEC and still have plenty of room onboard for a hoard of programs in Basic.

INTERFACING. Both the PC-8201A and Model 100 have the requisite printer, RS-232, bar code, and cassette ports (cassette data is transferred at a slow 600 baud, compared to the Model 100's 1500 baud). The printer port, by the way, accommodates the Radio Shack printer cable. But despite these similarities, there are significant differences.

The most important difference for many potential users is the NEC does not have a built-in telephone modem, nor does the TELCOM program offer automatic logon facilities. Anyone who desires to tie into a computer or data base will not like the idea of having to tote around another hunk of junk — a modem — while on the road. And since a modem will probably require AC power, forget trying to read electronic mail from a phone booth.

While the Model 100 has a bus expansion socket inside the trap door on the bottom, the PC-8201A has two expansion connectors on the back panel. These connectors are eight- and six-pin versions of the modular jack you've seen on telephones. Both ports, however, are not part of the bus. Rather, they are both extra serial ports with the following connections:

Pin 1 Signal Ground
Pin 2 Transmit Data
Pin 3 Receive Data
Pin 4 Request to Send (RTS)
Pin 5 Clear to Send (CTS)
Pin 6 +5 volts

Pins 7 and 8 of the 8-pin jack are not connected inside the computer. The +5 volts can be used to supply power to a peripheral. To these ports will be attached a disk drive and video display interface planned for the future. How their performance, flexibility, and pricing compare with similar developments for the Model 100 (some of which will be going through the system bus) remains to be seen.

MENU OPERATIONS. One nice feature of the PV-8201A is that many of the utility commands which must be performed in Basic on the Model 100 are handled with function key commands from the menu display. Loading a cassette file entails pressing F1 (Load) and responding to prompts for the source file name and how you want it saved in the computer. In loading a Basic forecasting program, for example, you would load from FCAST and save to FCAST.BA. When the player finds the file, it prints, "Found: FCAST" on the display. And when the load is complete, the file is automatically added to the directory as FCAST.BA. That's a time-saver.

NEC'S BUNDLE OF SOFTWARE GOODIES

One of NEC's big advertising pushes for the PC-8201A is it comes with a cassette of 14 programs in addition to the built-in ROM software. By my count, there are 15 programs, but who's going to quibble?

Six are business oriented: Memory Calculator, Text Formatter, Investment Portfolio, Linear Forecaster, Loan Evaluator, and Schedule Keeper.

The calculator produces an audit trail in the LCD and can print it out as well. Unfortunately, it's not particularly easy to use, especially with the 8201A's lack of a numeric keypad. A pocket LCD calculator would be a better companion.

The text formatter is an essential program if you plan on using TEXT for creating business documents, since the built-in printing routine, like on the Model 100, has no margin or pagination control. This cassette program, however, forces you to change the Basic listing if you want margins other than the ones delivered on the tape. More importantly, the printing routine here does not remove leading spaces at the left margin, giving your finished document a ragged left appearance — hardly acceptable in a business environment.

Of the other business programs, most perform simple, but useful functions, even if they require more work than you might expect. For example, in the investment portfolio manager, entries for new investments must be entered into the Basic code as data statements. This will be awkward, if not completely intimidating for someone not familiar with the language.

At best, these business applications can form the basis for more user-friendly programs written by someone well-versed in Basic. As delivered, however, most of these programs won't be of too much value to the non-technical user.

The utility programs are more functional. One helps you define new graphics characters, pixel by pixel. A group of three programs helps manage files around the RAM banks installed in the machine. The Terminal Mode Selector program presents a menu of telecommunications modes according to the name of the device or service you're about to hook up with. Thus, instead of performing parameter changes in TELCOM, you use this program to select the communications device and corresponding parameters with a main menu-like cursor.

—Danny Goodman

Other commands handled in the menu are renaming files, printing text files or listing Basic programs, and killing files. To perform any of these, you place the cursor over the file you want to act on, press the appropriate function key, and reply to the prompts. Killing a file, for example, is as easy as moving the cursor to the file, pressing F9, and responding with a "y" to the prompt, "Sure?". I like these menu functions.

Initial Program Load (IPL) is also controlled from the menu, but acts differently than on the Model 100. Instead of simply specifying a file (program or .DO) to be the IPL file, you have to create a separate file beforehand called IPL.DO. In it may be one word or a string of commands in Basic (without line numbers). The manual gives an example of putting in a simple password program into the IPL file. But in practice, it is an inefficient use of a valuable directory slot for a file that does it for you. Menu function keys enable or disable the IPL.DO file as needed.

FILE NAMES. One thing you have to watch out for on the PC-8201A is how you type in file names. Unlike the Model 100, which converts all file names into upper case letters, the PC-8201A honors upper and lower case letters differently. Thus, you can have a file in your directory called FILE.DO, one called file.DO, one called File.DO, and so on. This is frustrating at first when you try to load the cassette programs supplied with the computer, because you may type in the source program as being "calc", but as the computer reads the tape, it comes back with, "Skip:CALC." You must type all caps when called for. The same goes for uploading a text file name while in TELCOM.

THE BASICS. Although both Basic interpreters were developed by Microsoft, there are substantial differences that make most programs written for one incompatible with the other. This is largely due to differences in screen display commands. Radio Shack uses PRINT@ X, where X is a linear measure starting with the upper left corner. NEC, in its N82 Basic, uses the LOCATE X,Y command, where X is the horizontal and Y the vertical coordinates of the location. If you're used to coordinate kinds of graphics, then the NEC will be easier, but the Model 100 format is more compact in the interest of memory space. One notation can be easily converted to the other, however.

In running a disassembler program from the CompuServe Model 100 SIG data base, I discovered another Model 100 Basic command that is not supported by N82 Basic. You can't use the variation of MID$ that lets you replace specified characters of a string with other characters. Also, since the ROM program in the two machines is different, any prewritten program involving machine language subroutines or peeks and pokes won't run on the other. Lastly, a VARPTR command is lacking in NEC's Basic.

But N-82 BASIC does have a built-in renumber command to automatically renumber Basic program lines. And it's instantaneous.

In fact, when it comes to execution speed, the NEC runs rings around the Model 100, both in Basic and in performing some machine level functions like converting .DO pro-

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gram files to .BA files. As the two demonstration games on tape aptly show, the PC-8201A can hustle, even with the slow LCD display.

Unfortunately, the character set of the PC-8201A has virtually nothing preprogrammed beyond the basic alphabet, numbers, and symbols. Two groups of about 30 characters can be individually programmed. One group is then available from the keyboard with the GRPH command; the other group can be summoned only from a Basic program. Some programmers will surely prefer the ability to create graphics characters, while others won't want to invest the time.

MANUALS. In his *Creative Computing* comparison between the Model 100 and the Japanese version of the PC-8201A, Dave Ahl jokingly gave his vote to the Model 100 manual because it wasn't in Japanese. Well, the new NEC manuals are in English, sort of. It appears they were not only prepared in Japan as direct translations of the original manuals, but that no one who really understands English bothered to proofread them. They are littered with enough typographical and grammatical errors to make you wonder about the validity of the information you're reading.

The NEC computer comes with three manuals: a user's guide, Basic reference manual, and documentation for the cassette tape of programs included with the computer. There is no pocket reference guide. Even where the English makes sense, there is a lot missing from the explanations of many, many functions. About the only bright spot in these books is that Basic error statements are covered more fully than in the Model 100 manual, complete with solutions to errors. Despite the three books, you're left pretty much on your own.

AND THE WINNER IS... If I could have a Model 100 with the memory system, cursor controls, and Basic renumbering command of the PC-8201, I'd be in heaven. Or if I had a PC-8201A with a built-in modem, auto logon software, and IBM-style keyboard, I'd also be in heaven. This is exactly where I see these two notebook marvels squaring off. Each one has a feature or two that makes it highly desirable. Yet each lacks one or two built-ins, making the choice a difficult one.

If your penchant is for telecommunications in any of the work you plan for your portable computer, then by all means the Model 100 will have to do. You'll just have to learn to live within 32K of memory. That's not to say, of course, that Radio Shack or some inventive third-party developer might not come up with an option similar to the plug-in cartridge of the NEC. But whatever it is, it won't likely be as compact or well integrated as the NEC system. A portable mass storage device, like cassette or Holmes microdrive may hold you until then.

But if telecommunications is not that big a deal for you, and you don't have the keyboard concerns outlined above, the NEC's onboard memory should be most appealing. The most important question, however, is left unanswered: whether NEC will support the PC-8201A with productive American software in the same diversity as Radio Shack and third party developers already seem to be doing. For the moment, my bets are on the Model 100.

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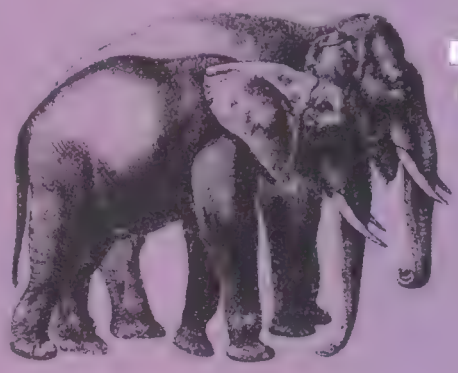

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EDIMATION

WELCOME TO THE WONDERFUL WORLD OF LCD ANIMATION

Last month, Richard showed you how to sketch on your MEWS. Now make those drawings move.

By RICHARD RAMELLA

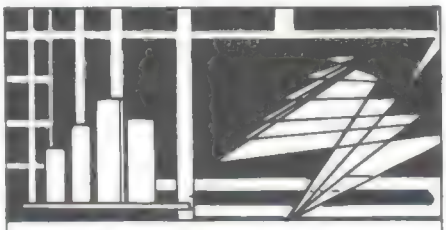
I invite you to populate your Model 100 world with moving creatures and objects.

Let me show you an easy way to create animation effects. It's called Edimation, which is a portmanteau word made of edit and animation. In computer jargon, the program Edimation is termed a graphics editor.

This program has equal charm and usefulness for beginning and advanced programmers. It lets you create shapes, compare different animation stages, edit those shapes, then store the data in a separate .DO file which is the basis for a program which uses the animation.

Edimation is meant as a companion program for Sketch Pad, which was published in the December issue of *Portable 100*. Sketch Pad allows the creation and storage of a single piece of art using PSET(X,Y) commands on a 50-by-50 grid. Edimation uses CHR$ symbols as building blocks for one- to five-stage pictures.

CHECK MANUAL. Before running Edimation, refer to the manual that came with the Model 100. On page 215, find the number 224 in the left hand column. It's blank, but it is useful. Continuing onto page 216, the graphic symbols numbered 224 to 255 are the shapes you will use to assemble your art. You will become better acquainted with these shapes through the friendliness of the program, so don't bother to study them.



Now, let's jump into Edimation with both feet.

When you have typed the program, I'd suggest you first save it as a file by typing "SAVE EDMAT.BA" and tapping enter. Then, whenever you want to use it, go to menu mode, cover EDMAT.BA with the cursor, and tap enter.

When the program runs, you are asked to make sure the CAPS LOCK key is up. Otherwise the program won't work correctly. Then tap enter to continue.

MENU. Next, you are shown a four-item menu. During the run of the program, you may call up the menu by typing "men." These other choices are available:

mov - See animation.
pro - Create program file.
see - See graphics symbols

Each of these choices will be explained as we move through the program.

To escape the menu, tap any key.

Now, you are asked how many stages of animation you wish: one to five. Of course, the term one-stage animation is mutually exclusive. If you choose one stage, you are simply creating a still life, and there will be many situations where this is exactly what you need. For your first effort, I suggest you tap 2 for a two-stage effect.

Now you will see a screen with a flashing dot, a vertical line, and these characters CHR$(224) - Stage 1.

CURSOR ACTION. The flashing dot is resting in the northwest corner of a grid with nine spaces across and eight down. The number 224 tells you the space where the cursor rests is a blank — CHR$(224). As an experiment, slowly type the number 239. You will see each number ap-

pear to the right of your work space. If the number is typed in correctly, a large dark square — CHR$(239) — will appear where the cursor rests. It will alternate with the cursor. At the top middle screen the 224 will change to the number 239. This number is always the CHR$ number of the graphic where the cursor rests.

Next, let's learn how to move the cursor around the workspace. Tapping the following keys takes the cursor in the compass direction indicated below:

A–North
Z–South
<–West
>–East

The cursor cannot be moved beyond the nine-by-eight grid.

You may set a CHR$ graphic into place by typing any number from 224 to 255. The pictographic symbols lower than 224 will not work. To erase a shape, position the cursor over it and type 224. To replace one symbol with another, position the cursor over the shape to be replaced and type the new shape's number.

SLOW TYPING. Because program run time makes typing rather slow, there will be times when a well-intentioned number entry will result in gibberish. To escape, tap any key until the area to the right of the work space goes blank. Then start again.

Review: Now you know how to move the cursor around the grid and to set shapes represented by the numbers 224 to 255. You also know that the number of the shape where the cursor rests is always shown at the top middle of the screen.

New knowledge: It is difficult to commit to memory all the shapes involved in this program. To see these shapes and their numbers displayed, type the word see instead of a number. You will be shown a table of all available shapes, each resting neatly below the first digit of the number which represents it. To escape this display, tap a key and you will be returned to the work screen with the first stage of animation displayed.

At times you will need a shape used earlier but don't know its number. Rather than going to the shape table, take the cursor to cover the earlier created symbol, note its displayed number, then move back to the new position and type that new number.

ANIMATION STAGES. Everything done so far has been in the first stage of animation. Remember, at the start of the program you chose two stages. To enter the second stage, type F2. The work area will blank. Note, the information line at the top of the screen lets you know you are in Stage 2. Now type F1 and the workspace will revert to the Stage 1 appearance you have already created.

Experiment: In Stage 1, set a few characters in place. Then type F2. In Stage 2 set a few different characters in different places. Now type F1, F2, F1, F2, and watch them change. But wait! There's a better way. Type mov and you will see a rapid exchange of the two stages. What we have here is the kernel of the animation process. To escape this mode, tap a key, and you will be returned to Stage 1.

The worth of being able to go from stage to stage by typing F1, F2 (and beyond if you have more stages) is that you are able to compare the stages and edit each to erase mistakes and make the movement more fluid.

The final step is near. At this point you know how to create multiple layers of art and compare them to each other.

CREATION IN CEMENT. The final menu command is pro. It stands for program. Do not type it until you are completely satisfied with the effect you have created. Those three letters set your creation in cement.

So let's set some cement.

Start the program over again and follow instructions exactly. We will create a simple animation and run it:

- Choose two stages of animation.

When you are in the work space mode:

- Type 252
- Type F2
- Type 254
- Type pro
- When asked the name of the file you have created, type test and tap enter.
- When asked for a string variable name, answer Z$ and tap enter.
- When asked the starting line, type 100 and tap enter.
- A screen message tells you the new file is being created and asks you to wait patiently.
- When the file is created, you will be referred to TEST.DO to see it. It will remain stored as a .DO file.

However, you want the data to work as a program. To turn it into a program, go to Basic mode, type RUN "TEST" and tap enter. It takes some time to make the change, but when the screen flashes an OK, signaling the program has been converted and run, it is in Basic. Nothing will happen other than that. Next, store the program in a .BA file by typing SAVE "TEST" and tapping enter.

The next step is to program a few lines that make the data work. In this case, run the program and depress the shift and break keys at the same time, then type in program listing 2.

These lines make the animation work. In fact, they do very little, but that's because the drawings are so simple, merely one character each.

You may not care how the program works, but a bit of study of the technique will help you when you take a creative leap on your own. I won't try to explain the lengthy program Edimation, but I would like to explain the program which results from it.

BETWEEN LINES 100–270. Refer to the program TEST, which you made. The lines created by the program Edimation are lines 100–270. In lines 100 and 110 the character graphics (224 to 255) are compressed considerably by giving them variable names running from A1$ through D5$. In lines 120–190 are the data for the first stage of the animation, and data for the second stage are in lines 200–270. The program Edimation read the 72 positions of each animation — nine across and eight down. It created lines of data which numerically mimicked the values you set when you were drawing. Example: In line 120, Z$(1,1) is equal to CHR$(252), compressed to D2$, plus nine blank spaces, CHR$(224), each com-

pressed to A1$. And all the symbols in the line are further compressed to Z$(1,1).

Lines 300-390 print the animation endlessly or until you break out of the program. Line 300 clears the screen, 310 sets the print position at zero, and lines 320-330 start a nested set of loops, which pick out the correct Z$(X,A) values for printing. Line 340 prints the first line of the first animation at zero, the second at 40, and so on. Then the second animation is printed over it by setting the value of V back at zero and looping through again. When this is complete, line 390 sends the program back to line 310, where it begins over again.

I'm no artist. Yet, I've managed to create some striking animation examples for adventure programs I'm writing for a book. With a bit of practice and experimentation, anyone able to key in the program Edimation will be able to create simple illustrations and animations that can equal or top mine.

JUMPING JACK. To give you a firmer idea of Edimation's capability, I'd like to end by giving you the template for reproducing a program I call Jumping Jack. It's a three-stage animation in which a figure leaps endlessly from side to side of the screen. It will involve adding some lines to the program created, but knowing how these lines work will help you understand how to move an animation about the screen.

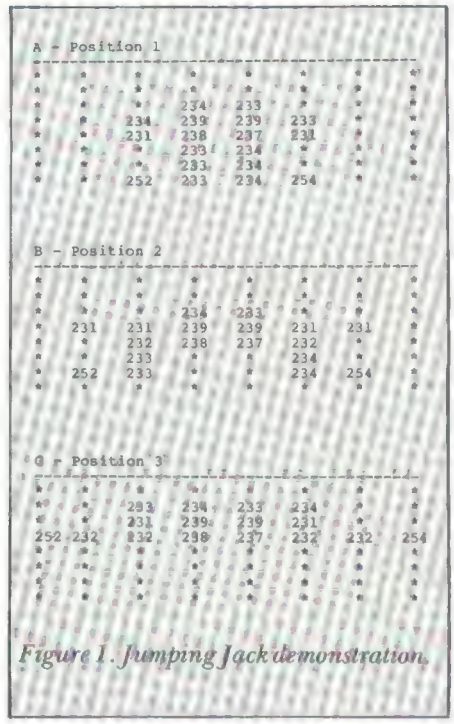


Figure 1. Jumping Jack demonstration.

First, run Edimation (listing 1) and choose three stages of animation.

Now look at figure 1. The grids A,B, and C are the first, second, and third stages of Jumping Jack.

In the first animation stage, move the cursor to each of the positions that has a number in it, type that number and move on. Then type F2 and do the same in the second stage, then do the third stage. If you wish, type mov to check the animation, then type pro to create the data file. When asked for a string variable name, type X$, and for starting line type 120. Now enter into the program you just created the program lines in listing 3.

Finally, if you program on an 8K Model 100, I suggest you work your way up to five stage animation. If the animation finds its way into a long program, you could run out of memory.

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Program Listing 1. Edimation program.

```
100 REM * EDIMATION
    : A Graphics Editor * TRS-80 Model 1
    00 * 8K * (c) 1983 by Richard Ramel
    la *
110 MAXFILES=1
120 CLS
130 PRINT "If CAP LOCK key is depressed,
     bring it"SPACE$(2)"up. Else, progr
    am won't work."
140 PRINT
150 PRINT "Tap a key to continue."
160 IF INKEY$="" THEN 160 ELSE CLS
170 CLEAR 1500                  | 190 GG=100
180 DEFSTR A,X-Z                | 200 GOSUB 1160
210 PRINT "animation stages (1 to 5)?"
220 E$=INKEY$
230 IF E$="" THEN 220 ELSE J=VAL(E$)
240 IF J<1 OR J>5 THEN CLS
    : PRINT "5 stages available"
    : BEEP
    : GOTO 210 ELSE CLS
250 DIM A(8,J)                  | 300 B=1
260 FOR G=1 TO J                | 310 C=1
270 FOR H=1 TO 8                | 320 D=1
280 A(H,G)=STRING$(10,224)      | 330 H=1
290 NEXT H,G                    | 340 M=1
350 LINE(66,0)-(66,63)
360 Z=INKEY$
370 PRINT @ B,CHR$(46);
380 IF Z="a" AND C>1 THEN C=C-1
    : B=B-40
390 IF Z="z" AND C<8 THEN C=C+1
    : B=B+40
400 IF Z="," AND D>1 THEN D=D-1
    : B=B-1
410 IF Z="." AND D<9 THEN D=D+1
    : B=B+1
420 IF Z<>"" THEN S=ASC(Z)
430 IF Z="s" OR Z="m" OR Z="e" OR Z="n"
    OR Z="o" OR Z="f" OR Z="v" OR Z="p"
     OR Z="r" OR S>47 AND S<58 THEN Y=Y
    +Z
440 IF LEN(Y)=2 AND LEFT$(Y,1)="f" THEN
    H=VAL(RIGHT$(Y,1))
    : IF H>J THEN H=1
    : Y=""
    : GOTO360 ELSE Y=""
450 U=VAL(Y)
460 IF Y="" OR U=0 THEN 470 ELSE IF LEN(
    Y)=3 AND U<224 OR LEN(Y)=3 AND U>25
    5 THEN Y=""
    : GOTO 360
470 PRINT @ 100,Y;SPACE$(4);
480 IF Y="pro" THEN 660
490 IF Y="men" THEN Y=""
    : GOSUB 1160
500 IF Y="see" THEN Y=""
    : GOSUB 1330
510 IF Y<>"mov" THEN 560 ELSE Y=""
520 FOR H=1 TO J
530 GOSUB 600
540 NEXT
550 IF INKEY$="" THEN 520 ELSE H=1
    : GOTO 360
560 IF LEN(Y)=3 THEN MID$(A(C,H),D,1)=CH
    R$(U)
    : Y=""
570 GOSUB 600
580 PRINT @ 12,"CHR$("ASC(MID$(A(C,H),D,
    1))")  - Stage"H;
590 GOTO 360
```

```
600 M=1
610 FOR V=1 TO 8
620 PRINT @ M,A(V,H);
630 M=M+40
640 NEXT
650 RETURN
660 CLS
670 INPUT "Ready to create animation fil
    e. In 6 or fewer letters, what's it
    s name";FF$
680 IF LEN(FF$)>6 THEN CLS
    : PRINT FF$" too long. 6 or fewer le
    tters."
    : BEEP
    : PRINT
    : GOTO 670 ELSE CLS
690 OPEN FF$ FOR OUTPUT AS 1
700 PRINT "Choose a string variable name
    ."
710 PRINT "Double letter variables (AA$,
     AB$ etc.) are PROHIBITED."
720 INPUT X
730 IF LEN(X)<>2 THEN PRINT "Wrong form.
     Must be one letter followed by $,
    as in A$, B$, C$, etc."
    : GOTO 710
740 CLS
750 INPUT "Starting line number of routi
    ne";V
760 CLS
770 PRINT "Animation/Art file being crea
    ted."
780 PRINT "Patience, please..."
790 VV=65
800 G=0
810 FOR HH=224 TO 255
820 G=G+1
830 MM$=MM$+CHR$(VV)+STR$(G)+"$"+STR$(HH
    )
840 IF G=9 THEN G=0
    : VV=VV+1
850 IF LEN(MM$)>125 THEN L=2
    : GOSUB 1280
860 NEXT HH
870 L=96
880 GOSUB 1280
890 G$=G$+STR$(V)
900 FOR W=1 TO 187 STEP 6
910 G$=G$+MID$(MM$,W,3)+"=CHR$("+MID$(MM
    $,W+3,3)+")
    :"
920 IF LEN(G$)>240 THEN G$=LEFT$(G$,LEN(
    G$)-1)
    : PRINT #1,G$
    : V=V+10
    : G$=STR$(V)
930 NEXT W
940 G$=LEFT$(G$,LEN(G$)-1)
950 PRINT #1,G$
960 V=V+10
970 FOR C=1 TO J
980 FOR B=1 TO 8
990 G$=""
1000 G$=STR$(V)+X+"("+STR$(C)+","+STR$(B
     )+")="
1010 G$=LEFT$(G$,7)+RIGHT$(G$,LEN(G$)-8)
1020 G$=LEFT$(G$,9)+RIGHT$(G$,LEN(G$)-10
     )
1030 FOR D=1 TO 9
1040 K=ASC(MID$(A(B,C),D,1))
1050 FOR J=4 TO 192 STEP 6
1060 IF VAL(MID$(MM$,J,3))=K THEN U$=MID
     $(MM$,J-3,3)
     : GOTO 1070 ELSE NEXT J
1070 G$=G$+U$
1080 IF D<9 THEN G$=G$+"+"
1090 NEXT D
1100 PRINT #1,G$
1110 V=V+10
1120 NEXT B,C
1130 CLS
1140 PRINT "See "FF$".DO for program."
1150 END
1160 CLS
1170 PRINT "Menu..."
1180 PRINT " men = Call up menu."
```


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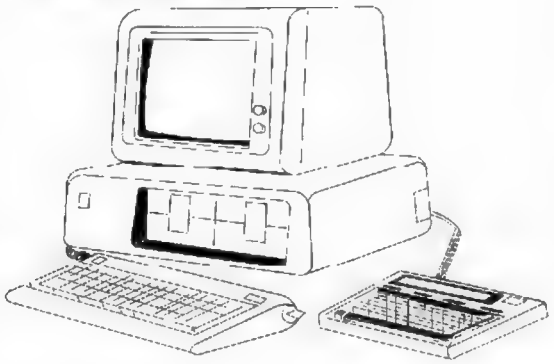

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```
1190 PRINT " mov = See animation."
1200 PRINT " pro = Create program file."
1210 PRINT " see = See graphics symbols.
     "
1220 PRINT
1230 PRINT "Tap a key to exit."
1240 IF INKEY$="" THEN 1240
1250 CLS
1260 IF GG<>100 THEN LINE(66,0)-(66,63)
1270 RETURN
1280 FOR UU=L TO LEN(MM$)-1
1290 IF MID$(MM$,UU,1)=CHR$(32) THEN MM$
     =LEFT$(MM$,UU-1)+RIGHT$(MM$,LEN(MM
     $)-UU)
1300 NEXT
1310 RETURN
1320 END
1330 CLS
1340 TT=224
1350 UU=0
1360 FOR QQ=0 TO 36 STEP 4
1370 PRINT @ QQ+UU,TT;
1380 PRINT @ QQ+UU+41,CHR$(TT);
1390 TT=TT+1
1400 IF TT>255 THEN PRINT @ 292,"(To exi
     t, tap a key.)";
     : GOSUB 1450
     : RETURN
1410 NEXT QQ
1420 UU=UU+80
1430 GOTO 1360
1440 RETURN
1450 Q$=INKEY$
1460 IF Q$="" THEN 1450
1470 CLS
1480 LINE (66,0)-(66,63)
1490 RETURN
1500 END
```

Program Listing 2. Program to make data work.

```
10 REM * TEST *
20 CLEAR 500
300 CLS
310 V=0
320 FOR X=1 TO 2
330 FOR A=1 TO 8
340 PRINT @ V,Z$(X,A)
350 V=V+40
360 NEXT A
370 V=0
380 NEXT X
390 GOTO 310
400 END
```

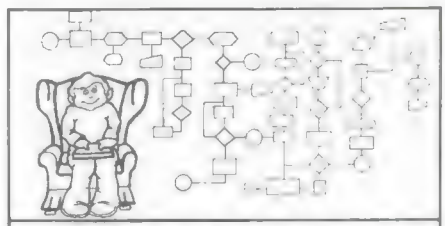
Program Listing 3. Lines for Jumping Jack.

```
1000 CLS
1010 H=0
1020 A=0
1030 FORX=1TO3
1040 GOSUB1100
1050 NEXTX
1060 FORX=3TO1STEP-1
1070 GOSUB1100
1080 NEXTX
1090 GOTO1030
1100 FORC=1TO8
1110 PRINT@A+H,X$(X,C);
1120 H=H+40
1130 NEXTC
1140 IFA=0THENR=1ELSEIFA>29THENR=0
1150 IFX=2ANDR=1THENA=A+1ELSEIFX=2THENA=
     A-1
1160 H=0
1170 RETURN
1180 END
```

BENDER'S BETTER WAY TO BETTER BASIC — 1

In this first installment, author Bender explains good programming habits are as valuable as a good subroutine.

By J. GARY BENDER



PROGRAMMING

In this series of articles I will present some ideas and techniques that will make it easier to develop and maintain programs for the Model 100, and most other Microsoft Basic computers. If you are new to computing, or new to the Model 100, I promise to save you many hours with these few tools and suggestions.

Programming tools are designed to make you more efficient as a programmer. Often this makes your program a little less efficient — either larger or slower or both. For applications (as opposed to games) this is usually an acceptable trade off. If a program takes 6 seconds longer to execute, but I can save you just one hour to develop it, you can run the program 600 times before the longer run time really costs you anything. Some of my suggestions will actually make you take a little longer to get your first version of a program running. This lost time will be recovered as soon as you need to modify the program or use part of it in another program. Applications evolve, and you can always assume that a program big enough to do something meaningful will have bugs in it. In other words, you will always go back and change something in every program you write.

AVOID NASTY HABITS. It might surprise you that my first group of programming tools are not on the computer but relate to you, the programmer, and your habits. When compared to a large computer organization, you are the end-user, the analyst(designer), the coder (programmer), and the operator. If anyone else will use the program, you are also the trainer and support staff. Later, you will be the maintenance programmer. You've got a lot of tasks and since you are also the most important individual (the end-user), you better do it right.

I think the single most important guide to keep in mind as you write a program is to write it as if someone else will read it. Write code you can be proud of. The only place for quick and dirty code is to test an idea to see if the computer will really do what you want. Even that can be a wasted effort because, if it works, you'll have to rewrite it to make it acceptable for inclusion in your programs. Always follow this guide and you may well end up with a clean, presentable, useful program, you can submit to a magazine or software publisher.

Even without a possiblity of publishing, six months to a year from now you will be the someone else reading your program. I challenge any programmer who has been writing programs for more than two years to tell me he or she hasn't spent half a day trying to figure out what they did in an old program that has suddenly been reactivated. You will do it yourself. Write something this year to help you prepare your taxes and save it for next year. A year later you will not remember how to run it and will end up reading the code to see what it does. That is, if you can find it on one of all those tapes you'll accumulate in the meantime!

So let's look at some of the more important things that you should do on a personal level in the operation of your data center.

TAPE OPERATIONS. Until other mass storage is available and accepted, cassettes will be your primary medium for long term storage. Start your tape library right. It is very easy to lose control of your tape operations.

Get a bunch of C-10 and a few C-20 tapes of reasonably good quality. Over $1 per tape is typical. Those packages with three C-90's for 89 cents are not going to save you anything. The shorter tapes are nice because they can be rewound quickly. During development work you should CSAVE your program often. If you have short tapes, it is easy to flip the cassette each time. That way, if you really blow the program, you have two backup points available.

Take two of the C-10 tapes and clearly mark them "scratch tape". There will be many occasions when you just want to quickly write something to tape, especially during tests. Having a couple of scratch tapes handy makes it safe to grab them. However, you absolutly must obey the rule that you *never* leave anything of value on a scratch tape at the end of a session. I don't mean you should erase it, but it should not matter if it is erased during the next session. If you have something on a scratch tape that you want to keep, take the time to copy it to another tape or relabel the tape and make a new scratch tape. If you don't get into this habit you will never be sure that a scratch tape is really okay to use.

Get a box of narrow labels that will fit on a cassette and on the end of the cassette box. Label all of your cassettes. Have at least one keyword large enough and clear enough that

you can read it through the window on your cassette recorder. Then get into the habit of verifying the name of the cassette before you hit the enter key on a CSAVE.

NUMBER YOUR TAPES. It is a good idea to assign a number to each cassette as soon as you purchase it. When you get enough cassettes that locating programs is a problem, the number can help you build a data base of what is where. Strange that many of us would not dream of having a disk with no ID number, but we may have a closet full of "miscellaneous" tapes. The fact is locating a correct tape is really more critical than finding the right disk because it takes so long to scan a tape.

You can save some wear and tear on the cassette motor relay if you close the relay before you turn on the recorder. This is not practical or advisable during CSAVE operations, but it is for CLOAD and MOTOR ON when you rewind a tape. Issue the command first, then push the button on the recorder.

If a tape contains stable, read-only programs, remove the write tab from the cassette. That way you won't accidentally write over one of your favorite programs. If you need to rewrite it later, you can put a piece of tape over the cutout to permit writing.

Always keep a copy of your programs on a separate tape. The backup tape should be stored in a separate place. If the vacuum cleaner magnetically "cleans" some of your tapes, you have not lost all. I usually have three copies of a program. There is a run version I actually use on one tape (usually just one or two programs per tape.) On another tape, I have a normal CSAVE copy on one side and a CSAVE,A on the other. I refer to the second tape as my source tape. It contains the long version of the program, with readable spacing and lots of comments. It also lets me modify and test a new version of a program without destroying the current version.

Now, that's not too bad for your tape operations is it? Once you stop and think about it, it is pretty much common sense. The hard part is in the doing. Develop good habits now, before you have a closet full of "miscellaneous" tapes. If you later move on to a disk system, these habits will be vital.

EXPERIENCE SPEAKS. I know many of you out there in 80-land will ignore the advice. After you spend a vacation writing a really great program and then clobber your only copy in two seconds, maybe then you'll change your ways. I'm not writing this just because I think they are good ideas. I found out the hard way. As it is, I lose more than I want to even when I follow good procedures.

A SYSTEM BOOK. So much for tapes; now let's look into some general things you can do to make your life with the Model 100 more productive.

Before you do another thing on your machine, start a "system book". This will be a collection of information you will sooner or later want to be able to find. I use a four-section, wire-bound notebook with pockets between the sections (nice for holding listings.) Anything you are comfortable using will do as long as you always keep it handy. A notebook that lies flat is important. You don't want to have to hold it open with one hand and type with the other.

I have my book separated into four general sections: system information, tools, subroutines, and applications. It is not tightly structured, although I generally dedicate a full page to any one subject area. The idea is to get the information written down where I can find it in a reasonable amount of time. Another big time waster is looking through all of your magazines for something you remember reading about.

FINDING INFORMATION. Maybe before we get into saving information, we should consider where you are going to find information. Other than books, which will be coming out for the Model 100 soon, I recommend three magazines: *Portable 100*, *Basic Computing*, and *80-Micro*. The latter two are more general publications covering all TRS-80 machines and carry specific Model 100 articles monthly. Radio Shack's *Microcomputer News* is a very good publication covering all TRS-80's.

Two other sources are personal contacts and the electronic extension of personal contacts, CompuServe. There are also bulletin boards all over the country, some of which have interesting Model 100 programs and information. In short, there is probably a lot more information available for the Model 100 than your pocket book can afford.

System information includes addresses used by Basic, POKEs and CALLs. You will find most of this in-

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formation in magazine articles. Note the brief ones in this section. For articles dealing extensively with the system, make a note of the magazine and issue so you can go back to it when you need to. Even if it is beyond you now, note it in the system book. A year from now you might be ready to handle it.

The tools section includes various utilities and tricks to make programming or the system easier or faster to use. This series deals with information in the tools and subroutines sections of your book.

SUBROUTINES. The subroutines section will grow as you develop routines that can be used in other applications. You will also find general subroutines in magazines. These will include graphics routines, curve fitters, and items like the derived functions from the back of the Model 100 manual.

Since all variables in Basic are global (variable A in your main program is the same storage location as variable A in a subroutine), it is imperative you note what variable names are used by a routine. The input and output variables, of course, are needed, but so are the internal variables. You don't want a subroutine to change a value without you knowing it.

The applications section will briefly document programs so you can locate, load, and run them later without first reading the code. You can make this documentation as extensive as you want. If there is any chance of generalizing part of the program, an explanation of how it works will help you later. This is another good place to write it for someone else to read.

PROGRAMMING HABITS. Next I want to mention a few programming habits you should cultivate.

Always sketch out your programs before you start coding. Depending on your level of experience and personal preference, this can be a detailed flow chart or just a layout of the logic branching. Before you start you should have a very good idea of what it will look like when you are finished. This will also show you good candidates for subroutines and places to separate your processing procedures for easier testing. You can develop a well-designed application, one functional piece at a time, testing as you go.

This will lead you right into a structured program. While you are entering the program, structure it *visually* as well as logically. If you have tried to enter a long program from a published listing, you already know how error-prone a packed listing is compared to one that is spaced and indented. If you don't like to read listings like in a magazine, why do it to yourself?

DEVIL'S ADVOCATE. Actually, there are two very good arguments for packing the Basic statements with no excess spaces and with multiple statements on one line. The program will require less storage and it will run faster. The extra spaces and remarks take up one byte of storage for each character. For large programs or if you require large array storage, that's an important consideration.

Additionally, the Basic interpreter has to read those blank characters while it is scanning for the next instruction. That can have a significant effect if there are a lot of excess characters inside of a loop.

However, during program development, being able to read and follow your code is much more important than speed of execution or program size. After the program works, you can go through and make a "run" version, stripping comments and extra characters from the program with a "stripper" or "packer" program.

You have probably noticed Basic will not remove leading blanks from a line:

```
10  FORI=1TON
20    A=A*A
30    B=B+1
40  NEXTI
```

Is much easier to understand than:

```
10  FORI=1TON:A=A*A:B=B+1:
NEXT
```

The second version will run noticeably faster. However, if the A*A was supposed to be A*B, which version would you rather debug?

Since the development version of your program will contain many spaces and comments, you may have to reduce the size of your arrays so you can test the readable version. Raise the array sizes to their normal dimensions when you pack the program.

IN PART 2. I hate to have to retype something that already works; or worse, reinvent it. I am continually building a subroutine library. Next month, I'll tell you how to build yours and reduce the runtime overhead caused by using subroutines instead of in-line code.

Circle No. 32 on Reader Service Card

DAVID BUSCH

BUSCH LEAGUE

WHILE AWAY THE HOURS MAKING FORTUNES THAT COULD HAVE BEEN

Editor's Note: Dave's column is based on his 25 Games for Your Model 100 *published by Tab Books of Blue Ridge Summit, PA 17214.*

Buy Low — Sell High." It sounds so simple, yet so many investors get it exactly backwards. Not you, though, right? You're just lacking a few essentials — like money, money, and money. Well, here's a chance to see how you would do if you had those essentials.

The object of this game is to amass a huge quantity of money, enough, preferably, to overflow the Model 100 screen and ruin the careful formatting I have done. This will require a great deal of money. Unlike the real stock market, you have just four stocks to choose from: IBM, NCR, ATT, and UAL. So the choices should not be overwhelmingly difficult.

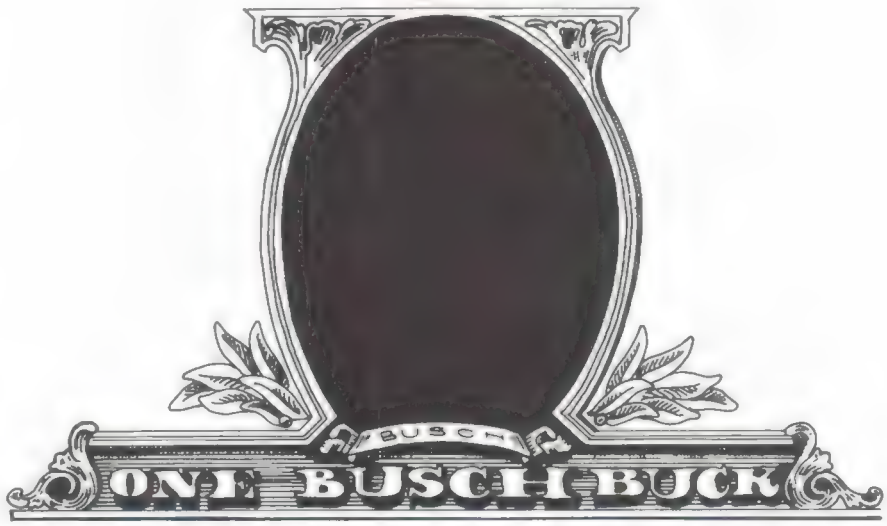
SIT OR SELL. Each turn, the values of the stocks go up or down, depending largely on whether or not you own any of that stock or not. Just kidding. You buy shares, or sell, or elect to do nothing and sit on your holdings. That may be all you have left to sit on if your decisions are not shrewd.

The program loops through a number of rounds, entered by the player in line 240. Then, the initial price of the four stocks is set, along with a "first" change for you trend-watchers. The price of each stock, PR(n), is set to a random number less than 100 in line 270. Then, a change is selected, between one and 19 dollars. This change may be up or down, depending on the value of a third random number, F. Then, the opening price, which is the current price, PR(n), plus the change, CH (and CH can be a negative number remember). If the opening price is less than one, it is set equal to one. We don't want any stocks selling for less than nothing, in order to avoid a run on that issue.

The turn starts at line 340, where the For-Next loop commences. The stock name, closing price, opening price, and difference between the two (the "change") is displayed. Then, the player can enter "B" for buy, "S" for sell, or "D" for do nothing. Depending on the option entered, control passes to either line 510, 750, or 990.

BIG BOARD. At the first routine, the stock names, current price, and number of shares owned (SH(n)) are displayed. The player elects to buy a stock by entering the number which appears next to that stock on the "big" board. Then, he or she is asked how much will be invested. It is impossible to spend more than you have in this game. (Ah, if that were only true in real life!) The money specified is used to buy the stock. No fractional shares are purchased. If money is left over, it is returned to the player's cash kitty.

The player can buy more, or return to the menu to be offered the same three choices again. The price of all the stocks remain the same until do-nothing is entered. Selling stock is similar to buying, except the player is asked how many shares of a stock are to be sold. You may not sell short, that is, more shares than you have, in this game. The do-nothing option merely triggers a new round of random number generation. Factor F again determines whether the price will go up or down, while CH is given a random value from 1 to 19. Unlike the real stock market, prices can go up or down only in integers, and jumps are limited.



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VARIABLES USED IN STOCK MARKET

A$	Variable used in INKEY$ loop
A	Value of A$
CASH	Player's money
CH	Change in price
DU	Dummy variable for RND(1)
F	Factor, +1 or -1. Shows direction of change
INVEST$	Money invested in a stock
N	Loop counter
OP(n)	Opening price
PR(n)	Current price of stock
ROUND	Round of play
SB	Stock bought
SH(n)	Shares held of a given stock
SOLD	Stock sold
ST$(n)	Name of stock
TURN	Turn of game, loop counter

```
10    ' ******************
20    ' *                *
30    ' * Stock Market  **
40    ' *                **
50    ' ******************
55    ' *** Set Random Start Point ****
60    FOR N=1 TO VAL(RIGHT$(TIME$,2))
70    DU=RND(1)
80    NEXT N
90    CASH=5000
100   DATA IBM,NCR,ATT,UAL
105   ' *** Instructions ****
110   CLS
     :PRINT
     :PRINT
120   PRINTTAB(12)"Instructions?"
130   PRINTTAB(16)"Y/N"
140   A$=INKEY$
     :IF A$="" GOTO 140
150   IF A$="Y" OR A$="y" GOTO 160 ELSE G
     OTO 210
160   CLS
     :PRINT
170  PRINTTAB(9)"Buy low, sell high."
180   PRINT
     :PRINT
190   PRINTTAB(9)"== Hit any key =="
200   A$=INKEY$
     :IF A$=""GOTO 200
205   ' *** How many rounds? ****
210   CLS
     :PRINT
220   PRINTTAB(4)"How many rounds to play
     "
230   PRINTTAB(8)"";
     :INPUT ROUNDS$
240   ROUND=VAL(ROUND$)
245   ' *** Set Initial Prices ****
250   FOR N=1 TO 4
260   READ ST$(N)
270   PR(N)=INT(RND(1)*100)
280   CH=INT(RND(1)*20)
```

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==========

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```
290  F=INT(RND(1)*2)+1
    :IF F>=2 THEN F=-1
300 CH=CH*F
310 OP(N)=PR(N)+CH
320 IF OP(N)<1 THEN OP(N)=1
330 NEXT N

335  ' *** Start Turn ****
340 FOR TURN = 1 TO ROUND
350 CLS
    :PRINT
360 PRINTTAB(5)"STOCK";TAB(11)"CLOSE";TA
    B(17)"OPEN";TAB(25);"CHANGE"

370 FOR N=1 TO 4
380 PRINTTAB(5) ST$(N);
390 PRINTTAB(11)PR(N);TAB(17);OP(N);TAB(
    25);PR(N)-OP(N)
400 NEXT N
410  PRINT
420  PRINTTAB(4)"[B]uy [S]ell [D]o Nothi
    ng."
430  PRINT@149,"$";CASH

440  A$=INKEY$
    :IF A$=""GOTO 440
450  IF A$="B" OR A$="b" GOTO 510
460  IF A$="S" OR A$="s" GOTO 750
470  IF A$="D" OR A$="d" GOTO 990
480  GOTO 440
490  NEXT TURN
500  GOTO 1080

505  ' *** Buy Stock ****
510  CLS
520  PRINTTAB(2)"Stock";TAB(12);"Price";
    TAB(22);"Shares owned"
530  FOR N=1 TO 4
540  PRINTTAB(2)N;".)";ST$(N);TAB(14);PR
    (N);TAB(24)SH(N)
550  NEXT N
560  PRINT
570  PRINTTAB(6)"Enter number stock want
    ed."

580  PRINT@149,"$";CASH
590  A$=INKEY$
    :IF A$=""GOTO 590
600  A=VAL(A$)
610  IF A<1 OR A>4 GOTO 590
620  PRINT@288,"How much to invest";
630  INPUT INVEST$
640  INVEST=VAL(INVEST$)
650  IF INVEST>CASH GOTO 620

660  SB=INT(INVEST/PR(A))
670  SH(A)=SH(A)+SB
680  CASH=CASH-SB*PR(A)
690  CLS
    :PRINT

700  PRINTTAB(13)"Buy more?"
710  PRINT
720  PRINTTAB(16)"Y/N"
730  A$=INKEY$
    :IF A$=""GOTO 730
```

```
740  IF A$="Y" OR A$="y" GOTO 510 ELSE G
     OTO 350

745  ' *** Sell Stock ***
750  CLS
760  PRINTTAB(2)"Stock";TAB(12);"Price";
     TAB(22);"Shares owned"
770  FOR N=1 TO 4

780  PRINTTAB(2)N;".)";ST$(N);TAB(14);PR
     (N);TAB(24)SH(N)
790  NEXT N
800  PRINT
810  PRINTTAB(6)"Enter number stock to s
     ell."
820  PRINT@149,"$";CASH

830  A$=INKEY$
     :IF A$=""GOTO 830
840  A=VAL(A$)
850  IF A<1 OR A>4 GOTO 830
860  PRINT@288,"How many shares to sell"
     ;
870  INPUT INVEST$

880 INVEST=VAL(INVEST$)
890 IF INVEST>SH(A) GOTO 860
900  SOLD=INVEST*PR(A)
910  SH(A)=SH(A)-INVEST
920  CASH=CASH+SOLD
930  CLS
     :PRINT

940  PRINTTAB(13)"Sell more?"
950  PRINT
960  PRINTTAB(16)"Y/N"
970  A$=INKEY$
     :IF A$=""GOTO 970
980  IF A$="Y" OR A$="y" GOTO 750 ELSE G
     OTO 350

985  ' *** Change Values ****
990  FOR N=1 TO 4
1000 OP(N)=PR(N)
1010 F=INT(RND(1)*2)
1020 IF F=0 THEN F=-1
1030 CH=INT(RND(1)*20)

1040 PR(N)=PR(N)+CH*F
1050 IF PR(N)<1 THEN PR(N)=1
1060 NEXT N
1070 GOTO 490

1075 ' *** Game Over ****
1080 CLS
     :PRINT
1090 PRINTTAB(12)"Game Over!"
1100 PRINT
1110 PRINTTAB(6)"You finished with $";CA
     SH

1120 PRINT
1130 PRINTTAB(12)"Play again?"
1140 A$=INKEY$
     :IF A$=""GOTO 1140
1150 IF A$="Y" OR A$="y" THEN RUN
1160 CLS
```


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TERRY KEPNER

FULL-DUPLEX

Editor's Note: Full-Duplex is dedicated to solving readers' Model 100 problems. Readers needing assistance should address their letters to: Terry Kepner, c/o PORTABLE 100, Highland Mill, Camden, ME 04843.

ESC KEY ESCAPES ONE READER

What is the ESC key for? The only mention in the manual is on page 4. It says it is the escape key. What a help! Can you shed light on this dark mystery?

Joseph Lehman
Kenosha, WI

The ESC key is used to transmit ASCII code 27, required by many printers for using their special functions. If you use a simple INKEY$ routine like the one that follows, you'll see that pressing the escape key returns the code 27:

```
10 $=INKEY$
   :IFA$= ""THEN10
20 PRINTA$,ASC(A$)
   :GOTO10
```

CLOSE ENCOUNTERS OF A STRANGE KIND

I recently purchased a Model 100 and have encountered several problems with an application I am developing.

1) Is there a way to link capabilities from an executing program and get control back?

2) Is there a way to alter a single fixed length line of text within a large .DO file without having to copy the entire file?

3) Is an assembly-language listing available which describes the operating system components of the 100?

4) How does one establish fields of reverse video? 5) What other undocumented features of the 100 are known?

Michael Kessler
Gaitherburg, MD

Unfortunately you can't link to TEXT from within a Basic program without having TEXT wipe out all the program's variables and operational pointers. For example, if you edit a program line after executing part of a program, all the variables setup during the execution have been wiped out.

If you're using a machine-language program, you can set aside memory using MAXRAM that would be protected from TEXT, letting you define variables and user input, call text, and return with your data intact. You would probably have to establish a temporary work file, put this into the file name buffer, and call it when you want TEXT. When you exit TEXT, a simple return command is used; TEXT doesn't know or care if you're returning to Basic, the menu, or a machine-language program.

TEXT starts at 24046D. The only way to alter a single fixed length of text in a .DO file, without opening the file, reading it in one line at a time and creating an output file for the corrected version, is to go directly to the menu of your 100, find the file entry you want, decipher the starting address of the file, and scan through it using the PEEK command until you find the string you want changed. Once you find the string, use POKE to change it. You cannot change the length of the string. Alterations are limited to the length of the original string.

This method has a problem because it requires the target file to be in one segment. Multiple segments will cause the string search to stop prematurely.

If you're using Basic to do this, use listing 1 to scan through the menu.

Machine-language is faster, and you can use ROM calls. First, load DE with the start address of the name of the file you want (terminate the name with a binary zero), then CALL 5AA9. On exit HL points to the start of the file. If the file is found, the Z flag is set. If the file is not found, the Z flag is reset.

Machine-language has a bit more flexibility. To insert a character in a file, put the character in register A. Point HL to the address of insertion and CALL 6B61. HL is incremented by one and if you run out of memory, the carry flag is set. To insert a series of spaces, put the number in BC, point HL to the address of insertion, and CALL 6B6D. On return, HL and BC are preserved and the carry is set if you run out of memory.

To delete characters from a file, load BC with the number to delete, point HL to the address of the first character, and CALL 6B9F. On return, HL and BC are preserved.

Reverse Video is implemented from Basic by sending CHR$(27), followed by "p". Everything sent after this point will be in reverse video. To restore normal video, send CHR$(27) followed by "q". Both ASCII characters must be lowercase.

KILL COMMAND KNOCKS'EM DEAD

I've had problems with the Model 100 kill command, it closes all opened files. Is this a bug?

David Nelson
Framingham, MA

This isn't a bug. The kill command is structured so it automatically closes all files before executing the "kill". This is to prevent a total

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TELEX+: From any phone send any text file to any Telex machine in the world. Just enter the receiving Telex number. Send Mailgrams for next day delivery to any address at reduced rates through the Action Telex system.

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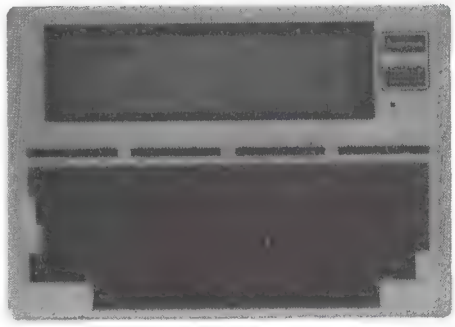
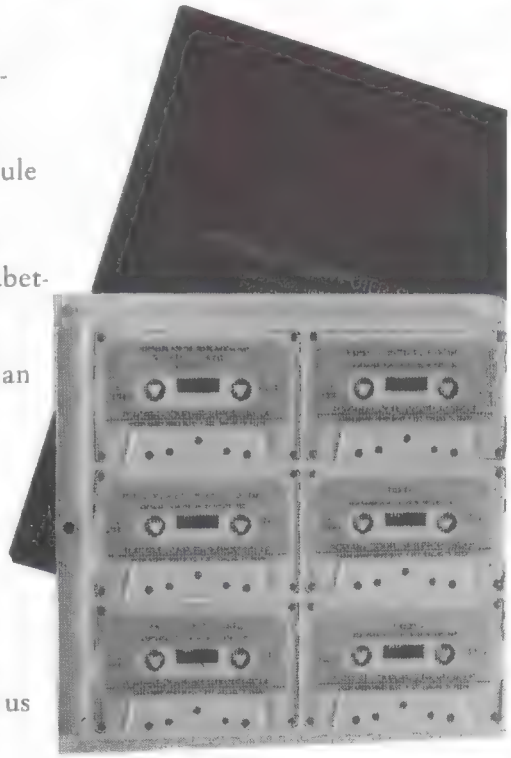
SORT+: Allows you to sort any list you compile with PUT+ alphabetically or numerically from any category in the entry. It can sort large files up to 20 times faster than an all Basic program.





MASTERCARD/VISA/COD

LOOK FOR DISK + ON PAGE 46

PCSG provides hotline software support for the Model 100. Give us a call at 1-214-351-0564.

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PORTABLE COMPUTER SUPPORT GROUP

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system crash should you accidently kill a file that happens to be open and try to use that file later.

EMBEDDING CODES USING A NULL

I have been only partially successful in "embedding" printer codes in text files. My problem is trying to generate ESC 0 (Basic would be CHR$(27)CHR$(0)), which is required to reset many printers when in text mode. Is there a way to solve this?

Bill Templeton
Danville, CA

The only solution I know is to create a short TEXT file which consists of two characters, an ASCII character and an ASCII zero. To do this, create a file of any two characters, and name it ZERO. Now change listing 1 by altering line 190: 190 POKE B+1,0:END and changing the file name in line 100 to ZERO. DO. Now when you run the program, it will find the ZERO file and POKE a zero over the second ASCII character in the file.

This gives you a file in memory with a null character. If you examine the file, you'll see the first character unchanged, then the up-caret followed by an asterisk. When you need the null character in your file, just leave your present file, go to the ZERO file and use the select key to copy the two characters into the paste buffer. Now return to your previous file and paste the null character into position. You must have at least one other character in the file with the null, or the operating system will become confused and you'll end up cold-starting your computer by accident. Hope that helps.

AN APPARENT BUG THAT'S NO BUG AT ALL

There's a bug in the Model 100 Operating System: it doesn't store bytes with the values 00, 1A, or 7F. The following program (see listing 2) illustrates this bug. Does anyone know of a way around this?

If you list the file, you'll notice that the 100 also goofs with the up-caret I (hex 9), printing a tab instead of up-caret I. Does Tandy know this?

Don Corbitt
CIS ID 75655,1516

That's not really a bug. The three bytes you list are used by the operating system to signify end of line, end of file, and end of data string during INPUT. If these weren't treated in the manner you describe, the operating system would become totally lost trying to read data from a stored file (in other words, the EOF command tests the data in the INPUT buffer for an ASCII 26 (1AH), finding it prematurely would destroy your data).

The same goes for the up-caret I, it is a control code for the display. If

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you are storing control codes, you're supposed to precede them with upcaret P so the operating system knows it is supposed to treat them as data and not as instructions. To prevent the operating system from self-destructing, Basic traps these codes and prevents you from writing them to a file.

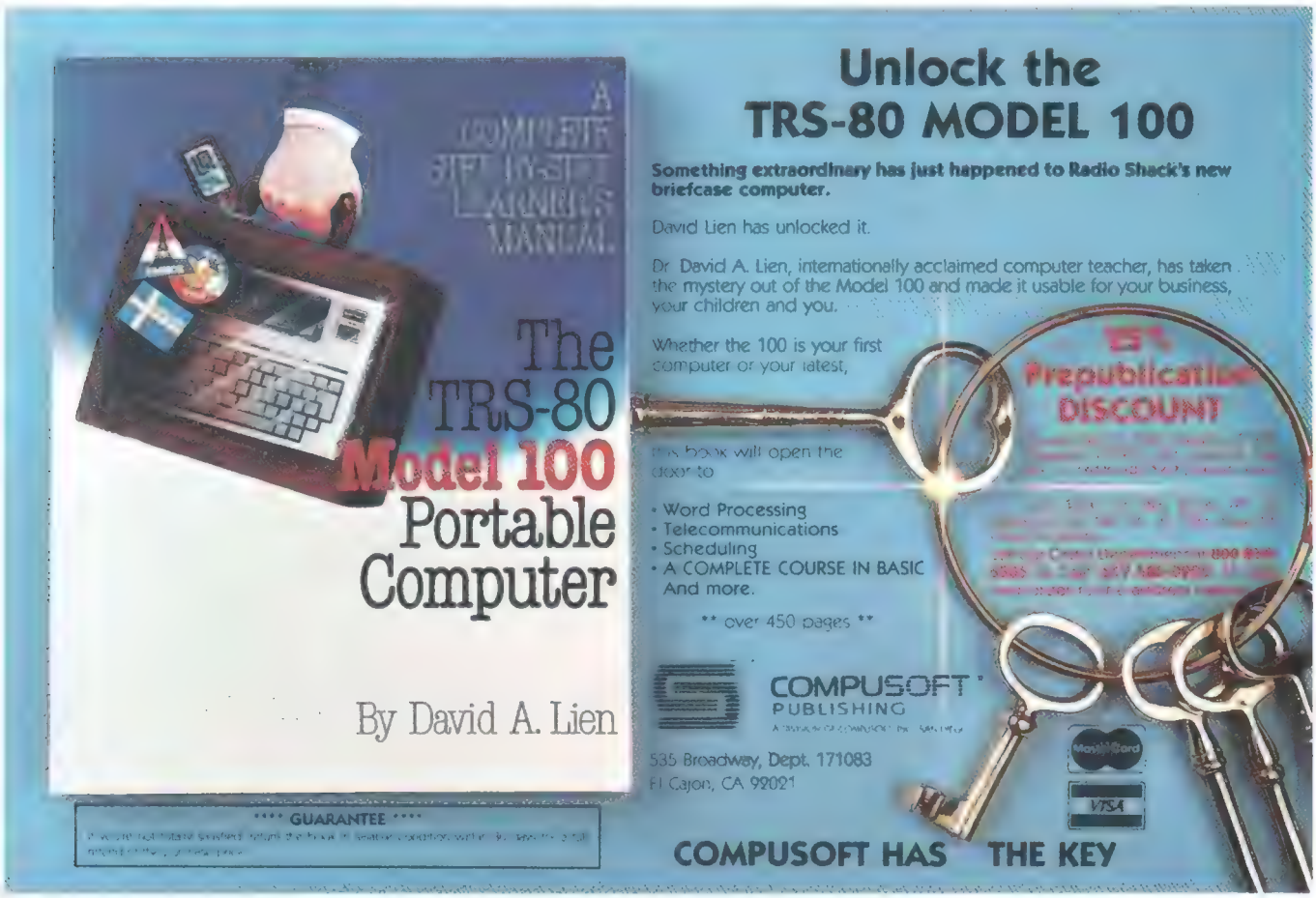
If you can think of a way to allow you to write these codes to a file while maintaining their use as file control codes for the operating system, tell Microsoft, I'm sure they'd be interested. (Don't forget that whatever method you use has to require very little room in the ROM or RAM, or they won't be able to use it.)

Program Listing 1: Menu Scan.

```
100 C$="FILE.DO"
110 I=63919
115 REM skip empty menu slots
120 I=I+11
    :IFPEEK(I)=0THEN120
125 REM check for end of menu
130 IFI>64128THEN200
135 REM see if it's a text file
140 IFPEEK(I)<>192THEN120
145 REM compare filenames
150 A=LEN(C$)-3
    :B=1
160 IFMID$(C$,B,1)<>CHR$(PEEK(I+2+B))THEN120
170 IFB<ATHENB=B+1
    :GOTO160
175 REM store file starting address
180 B=PEEK(I+1)+PEEK(I+2)*256
190 RETURN 200 PRINT "File not found."
    ? :END
```

Program Listing 2: Apparent Bug.

```
10 CLOSE
   :MAXFILES=1
15 OPEN"TFILE.DO"FOR OUTPUT AS1
20 FOR X=0TO255
   :PRINT#1,CHR$(X);
   :NEXT
25 REM print ascii zero to 255
30 A=0
   :CLOSE
   :OPEN"TFILE.DO"FORINPUTAS1
35 REM input the codes, print if not what expected.
40 I$=INPUT$(1,1)
   :IFASC(I$)<>ATHENPRINTA
50 A=ASC(I$)+1
   :IF NOT EOF(1)THEN40
55 REM increment counter until file end
60 END
```

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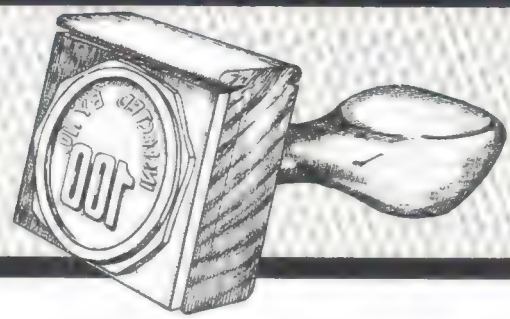
REVIEWS



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BY WOODY LISWOOD

(Editor's Note: Other programs in the Businesspak+ series were reviewed in the September, October, and November 1983 issues of Portable 100.*)*

Business owners of the Model 100 will appreciate the this offering from Sam Redman and company.

Telex is a global network of telecommunication machines used to transmit and receive high speed business communication between organizations with the service. Telex advertises there are over 120,000 terminals in North America and more than 900,000 worldwide. These, according to the literature I looked at, are all part of the RCA Globcom worldwide network.

ECOM stands for "Electronic Computer Originated Mail." It is the United States Postal Service's express mail for volume users who want to generate automated mail-merge letters from their files. What happens is your message is transmitted to one of 25 special post offices called SPOs, then printed, stuffed into a special envelope, and delivered as First-Class mail. There are lots of details for both these services. They require special software and special codes. That's where Telex+ comes in. It provides you with the built-in capability to take advantage and use either of these methods of communication. Once you own Telex+, all you need to do is pay the appropriate membership fee and away you go.

FREE MESSAGES. Since you may not know if you need this service when you buy Businesspak+, the Portable Computer Support Group has arranged for you to have three free messages through Action Telex.

When you are ready to try the program, you call Dallas and they put you in contact with the nearest Action Telex center. The documentation says Dallas will give you a code number so you can do this immediately. What really happens is Dallas takes your name, address, and telephone number and a few days later the Action Telex folks call, explain the system, and give you a special code number for the test. I live in San Francisco. I had to call long distance to Los Angeles for my test. However, the Action Telex told me they will soon have an 800 number available.

As I have found with all Businesspak+ programs, the documentation is easy to understand, to the point, and describes the program's theory as well as operation. That is what I look for in documentation.

Telex+ is simple to use. First you load three files from tape to memory: one Basic program to drive the machine and two special document files. Each of these files is critical to successful operation.

REVERSE VIDEO FILL IN. The ECS PEC.DO file is a screen image for you to fill in for the person to whom you wish to send your e-mail to. It is your name and address file. However, there is one special feature. The room for the characters you need to type are in inverse. You are instructed not to change these parameters and always stay within the bounds.

The T+SPEC document file is also a screen image file. However, this file contains the codes and telephone numbers necessary to use the telex service.

Here I had a problem with the program. It assumes you are going to use your Model-100 with the direct connect modem. Since I can't direct-connect in my office, I normally use the accoustic cups. There is no provision in Telex+ for you to dial the phone yourself and manually make the connection. To try the program I had to head home to my plug in phone and go from there. It worked perfectly, so why should I complain?

PLUG IN AND RUN. When you have filled in those two files, create a text document in the normal way. Then, plug in your phone and run Telex+.

First, you are asked what document do you want to send, then if you want to send it e-mail, Telex, or other. Other is for multiple telexes or e-mails, or a telex out of the country.

If you answer e-mail, the program takes over, makes contact with the proper computer, sends the document, quits, and that is that. Figure 1 shows e-mail sent to *Portable 100* when I was testing the program. As you can see, it is nothing fancy, but it does work. If I wanted to make a multiple mailing, catch your eye, and make sure you would open and read the letter, I might very well use e-mail as a tool.

If you are sending a Telex, you would be asked if it was to your normal destination (which you have as a default in the T+SPEC file or if you want to change that number.

AUTO NAME CHANGE. When Telex+ is finished, it says everything has been sent, and changes the last character in

```
ACTION TELEX
6399 WILTSHIRE BLVD #804
LOS ANGELES CA  90048

06-OCT-83 2041 1543 00005
06-OCT-83 2111 M843 BOS DU

JOHN MELLO
NEW ENGLAND PUBLICATIONS
HIGHLAND MILL
CAMDEN ME  04843

DEAR JOHN,

THIS SHOULD ARRIVE AT THE PORTABLE 100 OFFICES THROUGH

THE EMAIL SERVICE OF THE U.S. POST OFFICE.  I AM SENDING

THIS TO YOU AS PART OF A TEST OF THE TELEX+ PROGRAM FROM

THE PORTABLE COMPUTER SUPPORT GROUP.

IF YOU GET IT, WE WILL KNOW THAT THEIR PROGRAM WORKS

AND THAT THE SUBSIDIARY PROGRAMS WHICH CONNECT TO THE

ACTION TELEX FOLKS ALSO WORK.  IF YOU DO NOT RECEIVE

IT, THEN THERE WILL BE A "HOLE" IN THE REVIEW WHICH I

AM DOING FOR YOU.

KEEP UP THE GOOD WORK.

        <rM843> <g1543> <m00005> <s03> <i04843>

SINCERELY,

WOODY LISWOOD
```

the file name you were using to an X. For example, I labeled my text file to *Portable 100* MELLO. I told Telex+ to send MELLO. After all was done, the MELLO.DO file name was changed to MELLX.DO.

I did not test out the Telex+ capabilities in the multiple address and overseas modes, since I did not want to pay the $150 membership fee, the charges, or even have a list of names and addresses to send the message to.

There are a series of special formats you use if you want to send your message overseas. And the way the system works, if you send multiple messages to multiple addresses, you will actually have two separate transmissions: one for the letter, the other for the name and address file. Telex or e-mail does the merging.

If you want to access Telex or the postal service's e-mail, this program works, works well, and would be a welcome addition to a business library.

PLEASANT LITTLE GAMES FROM SILVERWARE

Model 100 Games #1
Silverware
P.O. Box 21102
Santa Barbara, CA 93121
$24.95

By ARLEN P. WALKER

Silverware, the people behind CLOAD for the Models I, III, and 4, and Chromasette for the Color Computer, now offer a cassette of games for the Model 100. The games (Blockade, Reversi, Frankenstein Adventure, and Alexis Adventure) are all written in Basic, and are large.

Blockade and Reversi fit into a 16K machine; the others require 24K — in fact, there's not much room left in a 24K machine after loading Alexis. (It takes about 18K to load!)

Blockade is an action game in

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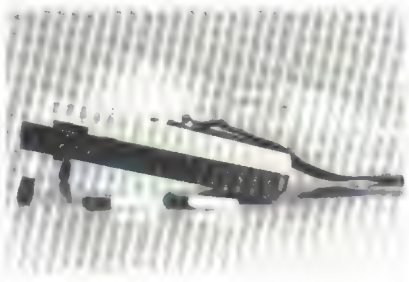

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which two segmented snakes (each segment is one of the space invaders characters from the character set) move around in a closed area attempting to eat small targets as they randomly appear and disappear. The first player with 100 points wins, or the first player with minus 100 points loses. Each target remains on the screen for a random period of time and is worth a random number of points, while running into a wall, or the opponent's snake, loses five points.

BETTER IS BIGGER. So far it sounds easy, but as you "eat" targets, your snake gets longer by the number of points you score for eating the target. It becomes nearly impossible to rack up 100 points without crashing your snake at least once, even when playing the solitaire "practice" version of the game.

As an action game, Blockade plays fairly well, but it has one serious flaw. It is written in Basic, so the response time can be agonizingly long. Forget reflex maneuvering with this game. You have to plan well ahead for every turn, as the computer needs a sometimes uncomfortably long span of time to realize you want to turn. This can cause trouble when attempting to pick up a target in a corner (or when playing "chicken" with the opponent's snake).

REVERSI. Reversi is a computerized version of the board game Othello. This is strictly a thinking game, with no call for reflexes or coordination. This avoids the main problem with Blockade, and it is quite enjoyable.

Reversi is played on a board 8-by-8 dots in size. As you and your computer opponent make moves, these dots are replaced by "tokens" identifying the owner of the piece. You move by placing a new piece on the board in such a manner that a line connecting that piece and the nearest of your pieces horizontally, vertically, or diagonally passes through an opponent's piece. Your opponent's trapped piece then "reverses", or changes sides to become one of yours. The winner is the player with the most pieces at game's end.

When I first sat down to this game, the computer frequently won. But as I became more familiar with the computer's playing patterns, I began to win. When I make a mistake, the computer can still win, but now I win more often than not. Perhaps a somewhat more complex move-evaluating routine can be inserted, but that might result in the computer taking too long to move.

All in all, the game plays well and can be a great distraction. It can also occupy kids during long trips. It never gets tired of playing!

ADVENTURE A LA ADAMS. Frankenstein Adventure and Alexis Adventure are games in the Scott Adams tradition. You are given a short textual description of the situation you are in and in a series of one- or two-word commands, you attempt to extricate yourself successfully.

There are shortcomings to this approach, such as small vocabularies and extreme literal-mindedness, but it works. It can be frustrating sitting at the keyboard typing synonyms until you stumble across the one word the computer knows for the action you have in mind, but that's part of the challenge of the game. Either of these two adventures is at least as good as anything I've seen from gamemaster Scott Adams.

In Frankenstein, you are given the mission of bringing Victor Frankenstein's monster back to life. There are the usual horror trappings (secret door, monster, werewolf), but somehow much of it seemed easy. The hardest part was figuring out the vocabulary. (I could have peeked, but that would have been cheating!) Still, the game was good for several hours of fun, and you do have the option of saving your current position and returning to it later.

Alexis Adventure seems to be more complex and difficult, and it certainly is larger. In this adventure you are the son of a deposed king and you must journey to the other islands in the archipelago attempting to raise an army to restore you to your rightful throne.

These adventures are pleasant little games which can keep you occupied for several hours...days... weeks.... (Be careful, this type of thing is addicting, you know!) Be sure and let your kids play a little, too!

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BANANA TESTAMENT TO TRUTH OF THREADBARE WISDOM

The Gorilla Banana
Leading Edge Products Inc.
225 Turnpike St.
Canton, MA 02021
$249.95

By JOHN P. MELLO JR.

According to popular wisdom, you get what you pay for. And such is the case with the Gorilla Banana.

This dot-matrix printer's best features are its "footprint" (an economical 16.6-by-9.3-by-5.4 inches) and its heft (10 pounds).

Its 5-by-7 matrix produces a character set without descenders (see figure 1) — 116 in all, including numerals, symbols, and foreign character sets for the United Kingdom, Germany, and Sweden. It also has dot-addressable graphics, seven dots per column over a maximum of 480 columns.

A recent review of the Banana mentioned it had a self-test function, but the reviewer couldn't determine how it worked. When I fired up my unit, all it did was self-test — repeatedly.

After tinkering with the printer's DIP switches (impossible to get at without removing the unit's cover), I called Leading Edge. Its service person was friendly and helpful. He explained that to make the unit compatible with a TRS-80 machine, a minor modification had to be made to a ribbon cable inside the machine. This isn't mentioned in the printer's documentation.

An aggravating aspect of the the Banana is its manual paper feed control. After finishing a document, a sheet of paper must be advanced by turning the paper feed dial on the top right of the machine. Paper can only be advanced. There's no reverse.

Friction feed and single sheets won't be accepted by the unit, a negative feature for users thinking of using the Banana for letterhead correspondence.

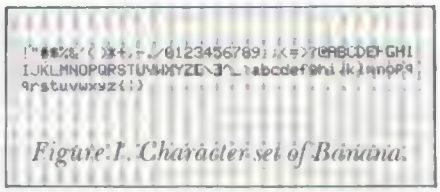

Figure 1: Character set of Banana.

Attempts to send a form feed from my 100 to the unit failed, so I had to write a Basic program to advance the paper (see program listing 1).

The Banana comes with tractor feed. Using 20-pound stock, I found the paper wouldn't advance properly. Lighter stock worked adequately for short documents, but longer ones ended with the paper failing to advance. Tractor-feed labels also wouldn't feed correctly through the printer.

When I had my 100 hooked into a data base and tried using the Banana to "echo" the incoming data stream, I found the unit couldn't keep up with the 100's output. After a short period of time, the printer dropped letters in words and garbled others. The inclusion of "nulls" in the data stream didn't solve this problem.

Although the 29-page manual is attractively arranged and full of diagrams and charts, I found it unhelpful in most instances.

Leading Edge rates the Banana's unidirectional print speed at 50 characters per second. I found the rating high. My tests showed the unit printing slightly more than 30 characters per second.

Overall, I found the Banana inadequate for most office functions, but for $249.95...you get what you pay for.

```
10 CLS:PRINT "HOW MANY LINE
   FEEDS?"
20 PRINT@240, "HIT 0 FOR MENU."
30 INPUTA
40 LPRINTCHR$(12)
30 NEXTX
40 GOTO10
```

Program Listing 1: Paper advance program for Banana.

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NEW PRODUCTS

AP TO PROVIDE STOCK AND V-TEX

The Associated Press has signed an agreement with Source Telecomputing Corporation to provide the AP stock and videotex news services to the more than 40,000 subscribers of The Source.

Formerly known as Viewdata, the AP videotex service will provide 250 daily dispatches of international, national, sports, business, and weather news. The AP stock service will provide regularly updated stock and bond reports, Dow Jones averages, closing tables of mutual funds, options, and various other stock and commodities information.

Registration to The Source costs $100, and basic use is billed at $20.75 per hour weekdays, and $7.75 per hour evening and weekends.

WHO'S WHO IN THE COMPUTER PUBLISHING WORLD?

Two separate publications are out, both claiming to be the most comprehensive sourcebook produced thus far for those who publish, buy, distribute, or advertise in computer periodicals and books. One is *Computer Publishers & Publications: An International Directory and Yearbook*; the other is *The Annotated Bibliography of Computer Periodicals.*

The International Directory reports details on over 700 publishers in the United States, United Kingdom, Canada, and Australia. The 400-page book will have a supplement, due out in May 1984, that will keep the basic volume current. It costs $115 with the annual supplement; $85 without.

The 600-page Annotated Directory describes over 500 publications about personal computing, systems and software, office automation, trade and applications, and data communications teletext. It costs $50.

For more information on the International Directory, write: Communications Trends Inc., 710 Webster Avenue, New Rochelle, NY 10801 or call 914-576-7175.

Readers interested in the Annotated Directory should write: Data Courier Inc., 620 S. Fifth Street, Louisville, KY 40202.

SWITCH & MUX OFFER PACKAGE FOR REPORTERS

New software has been designed for the Model 100 for transmitting text files from memory or cassette tapes to a newspaper's editorial system.

Switch & Mux Inc. of Merrimack, NH, has completed the package called Newsline Communicator. The package meets the American Newspaper Publishers' Association's 1312 High-speed Newswire Bulletin Protocol, is user-friendly, and requires few strokes to complete a transmission.

The Switch & Mux offering allows the user to have complete control over the service level designator, category indicator, and story priority. The ability to change these allows the user to take advantage of the editorial system's autorouting capabilities.

For example, when sports stories are transmitted to the editorial system, they will be autorouted to the sports editors queue or directory, as if they were received from an Associated Press or United Press International high-speed newswire. This makes the communicator compatible with any editorial system that receives a high-speed newswire data stream.

The package sells for $990.

Switch & Mux have also released a new briefcase designed for the 100. It is made of aluminum with a vinyl covering and features a three position combination lock. The package includes the briefcase (which measures 21-by-15-by-4 inches and weighs approximately 6 pounds), foam insert, four nicad batteries, and battery charger. It retails for $135.

Switch & Mux have a second briefcase, too. This one contains the 100, cassette recorder, acoustic couplers, microphone, and accessories. This case plus the reporter's software sells for $2995.

COMPUSERVE TO OFFER DIRECT MARKETING

A four month pilot program, scheduled to start this month on the CompuServe Information Service, will mark the first time major advertisers and direct marketers will have the opportunity to participate in a national test of the advertising and merchandsing potential of a commercial videotex service.

A CompuServe spokesman reports the objective of the pilot is to evaluate advertising support capabilities, to develop new ideas that would enhance advertising potential, and to test the degree of advertising acceptance among CompuServe's active subscribers.

L.M. Berry and Company, based in Dayton, OH, will act as an interface between CompuServe and participating advertisers and agencies. L.M. Berry and Company publishes Yellow Page directories.

HELP FOR PEOPLE LOST IN JARGON JUNGLE

Computers have spawned a language all their own — slang that's colorful, but often bewildering. Although we're sure 100 owners know their stuff, there might be other readers out there that still don't know a disk from a data base, or a bubble sort from a breakpoint.

The Computer Dictionary offers to "save you valuable down-time, and multiply your enjoyment and expertise by several megabytes".

The publishers of this state of-the-art dictionary say newly-coined computerisms like zeroing, bit- map, and firmware are all included. Every word is entered alphabetically, with a "reader-friendly" definition.

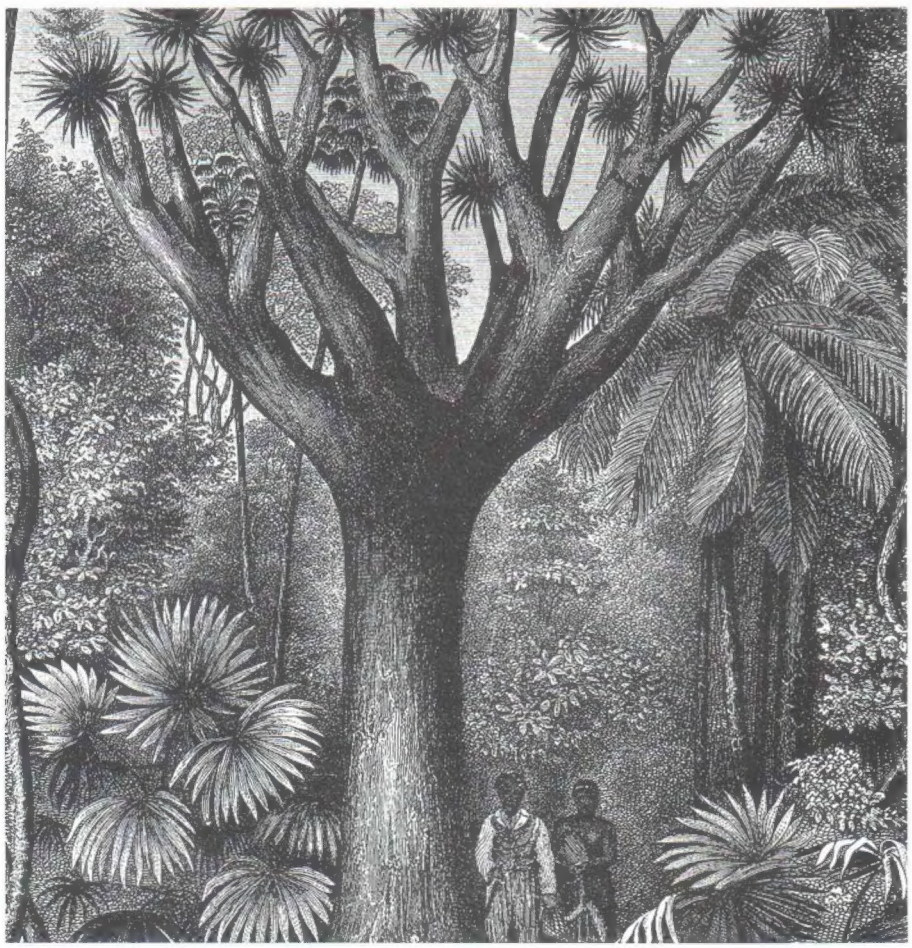
The dictionary is offered by Running Press, 125 South Twenty-second St., Philadelphia, PA 19103; 215-567-5080.

DAISY-WHEEL PRINTER OFFERS LOW-COST ACCESSORIES

The ComRiter CR-II daisy-wheel printer is now offered by Comrex International Inc., 3701 Skypark Drive, Torrance, CA 90505; 213-373-0280.

It features a low-cost, cut-sheet feeder; keyboard; and tractor feeder. The accessories make it a complete letter-quality printing system capable of performing as either a sophisticated word processor with most personal computers or as a stand-alone electronic typewriter with two-color printing capability.

The CR-II is a 12-CPS printer compatible with most microcomputers and word processors and has a suggested retail price of $599. Suggested retail prices are $199 for the keyboard, $259 for the cut-sheet feeder, and $120 for tractor feed.



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END TRANSMISSION

AIR 100: WHAT'S ALL THE SHOUTING ABOUT?

I first flew with my 100 last April on a United 767 to Chicago . I didn't have the 100 out of my briefcase for two minutes when a crowd formed around me. At least four stewardesses and as many passengers all wanted to know what kind of typewriter it was.I took it with me to work during the flight, but I had to answer so many questions and give so many demonstrations that working was impossible.

Not long ago, while waiting to board a Delta flight from Fort Worth, TX, to Portland, ME, I asked the airplane's captain if he had a problem with my using the 100 during the flight. "Of course not," he answered. "Why do you ask?" He was surprised I had even bothered to ask permission.

SURPRISE SURPRISE. I was surprised he was surprised. Surely, in-flight use of portable computers was being as hotly debated in his profession as it was in mine. Maybe he hadn't been reading his trade journals lately.

Still, "Why do you ask?" certainly seemed like the world was going on without this guy. And I'm placing my life in his hands? How could he have missed the voluminous pages devoted to the great airline safety versus portable computer debate. I gratefully thanked him and walked into the boarding tube.

I was halfway to the plane when he shouted in jest, "If we planned on flying near Soviet air space I would have said no." I caught the reference to Korean Airline flight 007. And to an item in *Newsweek* quoting an unnamed KAL official as saying the flight might have veered off course because a passenger had been using a portable computer.

Was the captain ridiculing the KAL official? The incident got me thinking about the many messages I've read on CompuServe's Model 100 SIG vociferously debating the issue.

FABRICATED ISSUE? Is the airline safety argument fabricated merely to have something to get technical about? I don't think so. If an airline as big as Eastern bans the use of portables during flights, the question has to have some validity. I've been told that under current FAA regulations even pocket calculators are not cleared for use during air travel. When I told the captain some airlines don't permit the use of portables, he just laughed. Maybe the controversy was some inside joke airline captains were playing on computerists.

A few weeks ago I was traveling on People Express with three other *Portable 100* staffers. I was about to ask the steward about using the 100 when I noticed People's ticket collection-system involved the use of a pocket computer that looked *very* familiar.

The steward had heard about the problems some airlines were having with portables, but he assured me, as he nudged his pocket model, his airline had no problem with the machines. As a matter of fact, he informed me, People Express will soon be supplying their flight personel with portable computers to check schedules and assignments on a private telecommunications network.

TANDY CONFIDENT. Tandy is confident the 100 doesn't pose any type of threat to airline safety. Yet, in their view, it would be wrong to ignore the concerns. To that end, they are supporting, encouraging, and cooperating with the various federal agencies, involved so everyone will be satisfied portables represent no threat to the well-being of air travelers.

I am sure some day soon airlines will provide in-flight hook-ups, so we will be able to connect to data bases via satellite. Hopefully, when in-flight use advances to that stage, the debates will occur before implementation.

NEXT.100

Color. Yes, color. Right there in your 100. All you need is a little gadget called Mikrocolor. We've been putting that box through its paces and next month, we'll let you know our findings.

Gary Bender's second installment on his programming series will explore subroutines and tell you how to create useful ones. And Scott Norman will be reviewing two statistical packages from the folks at Skyline Software.

Meanwhile, Jonathan Ericson, editor of a McGraw-Hill book on the Model 100, will show you how to use your 100 to keep track of your travel expenses.

The notebook your parents used didn't do much. At best, it just lay on a desk, a repository for a lot of more-or-less legible handwriting.

NEC's PC-8200 portable computer is a notebook, too. Except it's got big-computer memory and big-computer power—all in a battery-powered 4 lb. package for under $800. You get a big 40-character/8-line screen. Plus NEC gives you 14 free software packages to start, including an investment portfolio and word processor.

You can use the PC-8200 to take fast, legible notes in class, perform calculations, solve difficult math and science problems, and for virtually anything else you used to do by hand. With optional graphics, you can even doodle. And with the optional printer, you can get rid of your clunky portable typewriter.

The CMOS-based PC-8200 is the best portable computer you can buy, and at the best price. See it at your NEC dealer before you buy all your school supplies.

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Free bundled software	Yes	No	No
Function keys	10	8	0
RAM cartridges	Yes	No	No
Bar Code Reader, RS232, Parallel Port, Cassette Port	Yes	Yes	Not Standard
Floppy Disk and SIO Port, Cursor Cluster	Yes	No	Not Standard

*Includes perpetual clock calendar. NiCad battery pack, AC adapter charger optional.

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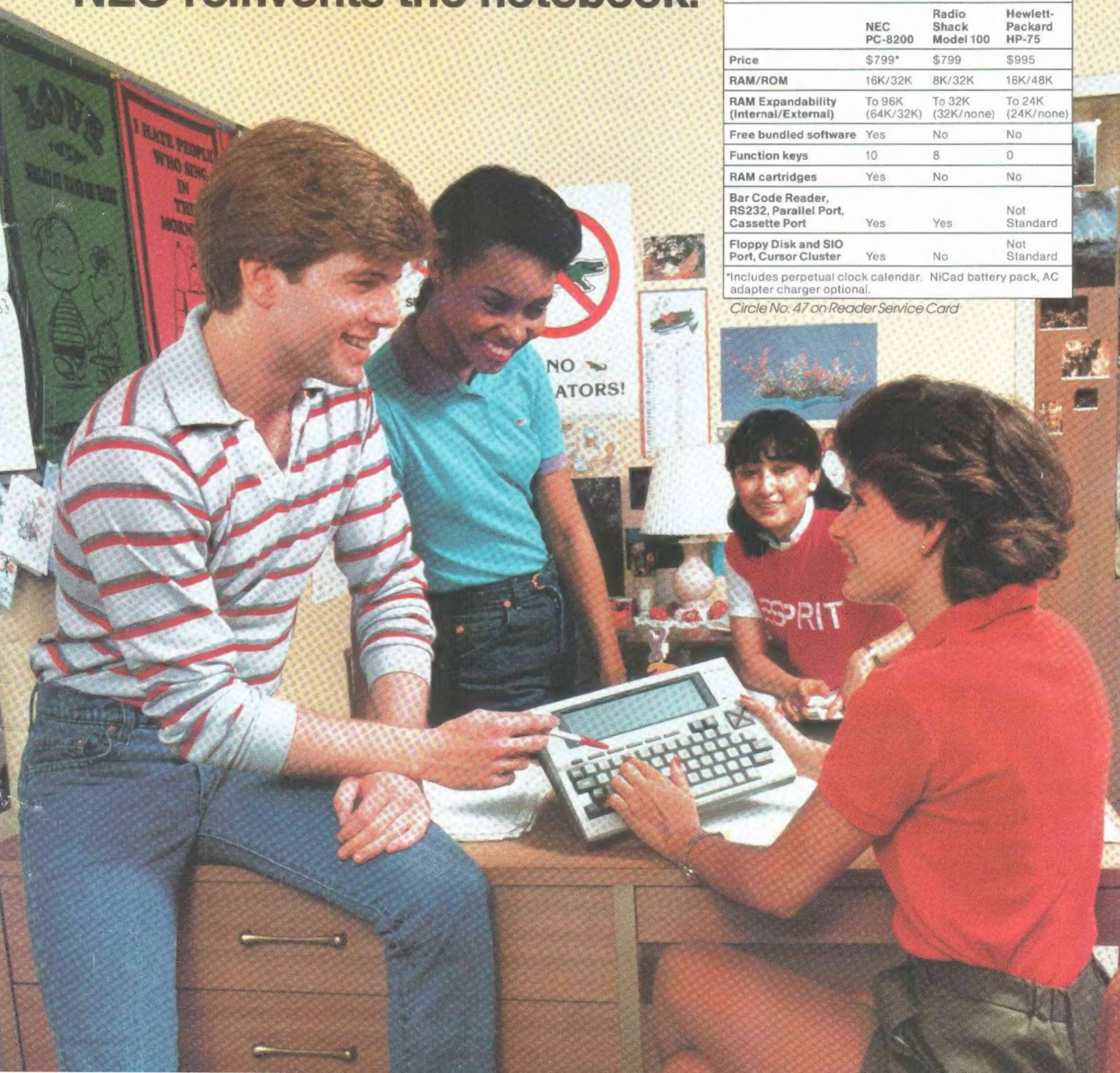

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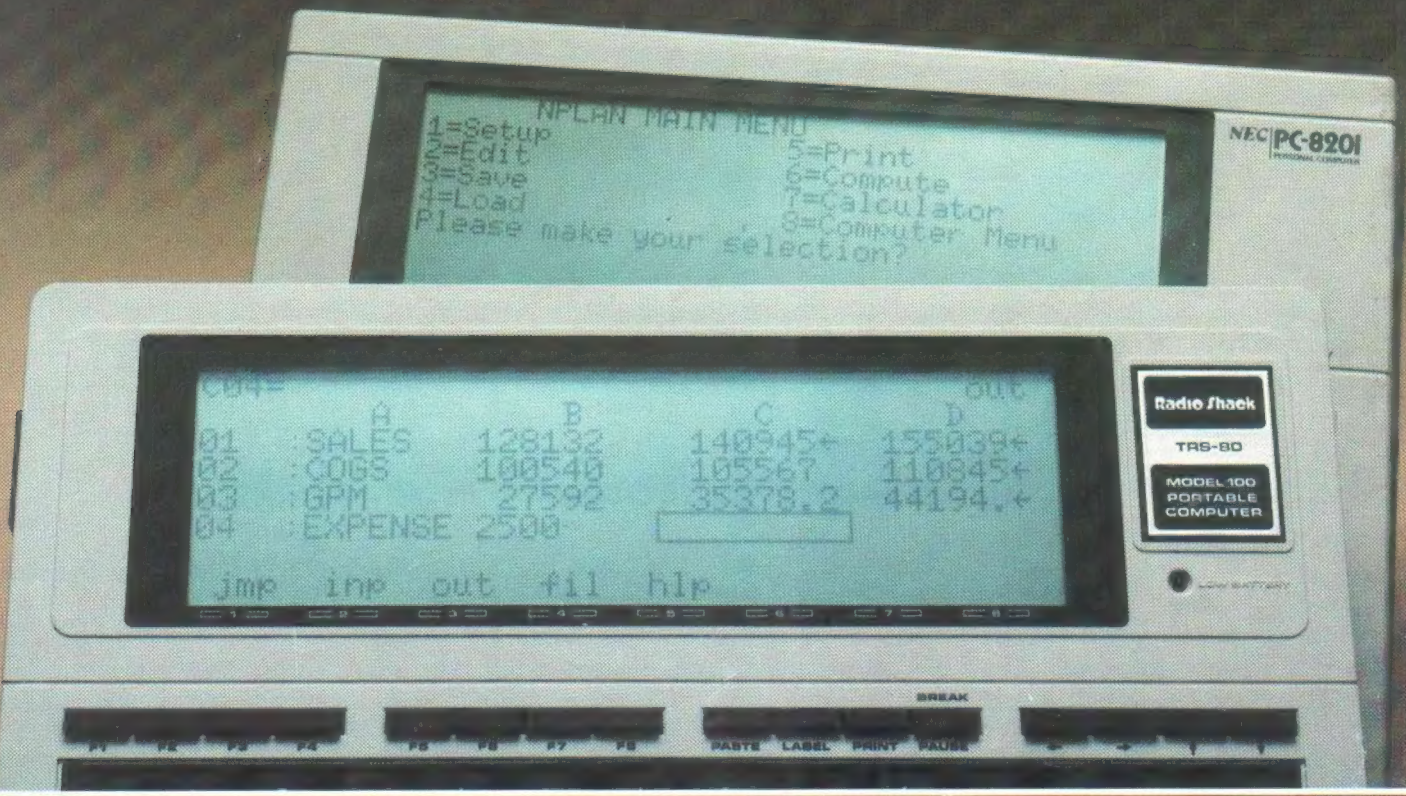

Write for free catalog listing additional Model 100/8201A business and engineering programs.

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